

Quantum Monte Carlo and the CASINO program IX



Cambridge University International Summer School
Sunday 3rd August - Sunday 10th August 2014
The Apuan Alps Centre for Physics @ TTI, Vallico Sotto, Tuscany, Italy

vallico.net/tti/tti.html
vallico.net/casinoqmc

This is the programme for the ninth international quantum Monte Carlo Summer School to be held at TTI. The event will be organized and run by the TCM Group from Cambridge University's Cavendish Laboratory. The purpose of the school is to provide the student with a thorough working knowledge of the quantum Monte Carlo electronic structure method as currently used in quantum chemistry and condensed matter physics, and to show him or her how to use the Cambridge CASINO QMC program for serious scientific research. The course will consist of around 20 hours of lectures by recognized experts in the field and a series of practical exercises in using the CASINO program led by its authors. No previous background other than a basic knowledge of quantum mechanics is assumed. Knowledge of density functional theory and similar methods is useful, as is an ability to work within a Unix/Linux environment. As with all events at the Institute, formal lectures are restricted to the mornings, and participants are encouraged to spend much of the rest of the day thinking, contemplating, and discussing the issues at hand. Practical computer exercises after lunch will be followed by a programme of recreational activities such as mountain walks, cave trips, and city visits organized for the latter half of most afternoons; the days generally conclude with evening meals in local family restaurants.

1 LIST OF REGISTERED PARTICIPANTS

Ali Bagci	University of Clermont-Ferrand, France	ali.bagci at yahoo.com.tr
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Eike Caldeyeyher	University of Bonn, Germany	e.caldeyeyher at gmail.com
Kuang-Yu Samuel Chang	University of Basel, Switzerland	k.chang at unibas.ch
Shibing Chu	Lanzhou University, China	chushb09 at lzu.edu.cn
Caterina De Franco	University of L' Aquila, Italy	caterinadefranco at gmail.com
Katharina Doblhoff-Dier	Friedrich-Schiller University, Jena, Germany	email too long for this space
Sabri Elatresh	Dalhousie University, Canada	Sabri.Elatresh at Dal.Ca
Fatih Ersan	Adnan Menderes University, Turkey	fatih.ersan at adu.edu.tr
Jan Florian	Loyola University, Chicago	jfloria at luc.edu
Wei Guo	University of Bayreuth, Germany	mailtuguowei at gmail.com
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Jan Jenke	University of Bochum, Germany	jan.jenke at rub.de
Yelda Kadioglu	Adnan Menderes University, Turkey	ykadioglu at adu.edu.tr
Secret Woman	address withheld	email withheld
Thomas Mellan	University College, London, U.K.	t.mellan at ucl.ac.uk
Christoph Reimann	University of Bonn, Germany	chr at thch.uni-bonn.de
Giovanni Rillo	La Sapienza, University of Rome, Italy	giovanni.rillo at gmail.com
Peter Townsend	University of Cambridge, U.K.	psmt2 at cam.ac.uk
Fan Wang	Sichuan University, China	wangf44 at gmail.com
Thomas Whitehead	University of Cambridge, U.K.	thomas.whitehead1991 at gmail.com
Dmitry Zvezhinsky	IITEP, Moscow, Russia	zmitja at yandex.ru

Family: Chorpure Chang, Minder of Saudi Woman (19)

Staff: Mike Towler, Neil Drummond, Samantha Keil, Saska Towler, Jamie Towler, Lisa Johnson-Davies, Alex Haider, Sam Azadi

2 FLIGHTS AND TRANSPORT

In this section we explain how to get to the Institute for people flying into our recommended airport - Galileo Galilei Airport, Pisa. It is also possible to fly to Florence (Firenze) which is only slightly further away, though flights to this airport are limited. In principle one could also fly to other airports such as Perugia, Bologna, Ancona, Parma, Milano, Verona, Genova or Roma but you should count on a train ride of up to four or five hours to get to the Institute (we can arrange this for you). A list of airlines flying to Pisa with links is given on the TTI web page (see 'Flying to Italy' in the left-hand column) and there is a map on the Pisa airport web page (http://www.pisa-airport.com/index.php?lang=_en – click the 'Destinations' link). Americans should note that Delta Airlines operate a direct service to Pisa from New York (the only direct service from outside Europe). Further details about transport, including how to drive to the Institute, are also given on the TTI web site.

Participants should aim to arrive at Pisa airport on Sunday 3rd August. If this is not possible - perhaps if flights from your country are irregular - then we recommend having a brief holiday in Florence or elsewhere before coming to TTI, or you could always volunteer to arrive early and be put to work! Late departures are in principle possible - please ask.

How to get to TTI from Pisa airport on Sunday 3rd August:

Go to Pisa Centrale train station. To get there from the airport we normally recommend you take a taxi - you can see the taxi rank as soon as you exit the airport terminal building. The *stazione* (phonetic: 'stasjonay ferrovya') is a 5-minute journey. However a new and much improved bus service has just been introduced which is much cheaper (1 EUR 30) and leaves every ten minutes (the bus stop is on the left as you walk out of the terminal building - look for the white tent-like structure with 'PisaMover' on the side). Tickets for the bus are available from the Pisamover kiosk in the terminal building (they will also sell you your train ticket..). This is a new service introduced because they've just dug up the railway connecting the airport to the train station in order to replace it with some kind of fancy monorail - see the video here:

http://www.pisa-airport.com/index.php?lang=_en&id_sect=438

Once at Pisa Centrale station you then need to get a train to Barga-Gallicano. This is an isolated station north of the city of Lucca somewhere along a branch line going up the Serchio river valley into the mountains (see the map on the TTI web site). Depending on the train time, you may need to change at Lucca to get the train north. The train will usually be flagged as going to one of four final destinations. "Aulla-Lunigiana", "Minucciano", "Piazza al Serchio" or "Fivizzano". See the printed timetables on the station wall to check where each train stops (for the usual stopping trains Barga-Gallicano is the eighth station stop after leaving Lucca; start getting ready to leave the train after Fornaci di Barga station). The electronic screens in the station show the departure platform ('binario'). Note that in Italian, Departures is 'Partenze', and Arrivals is 'Arrivi' - make sure you're looking at the right screen!

You can't buy the train tickets in advance (this is only possible for big important trains) but it is easy to buy them either from PisaMover in the airport or at the station, where you can ask a human ("Uno a Barga-Gallicano. Solo andata.") or one of the red, white, and green ticket machines, which can be requested to speak English. On all Italian train journeys you are supposed to validate ('convalidare') your ticket by inserting it into one of the small wall-mounted green and white machines in the station or you may have to pay a fine - though you should know that in ten years I have never seen a ticket inspector on any of the trains that you will take. Note that Italian trains are very (even absurdly) cheap by international standards, particularly British ones. The ticket should cost around 4 to 6 Euros.

One final thing that has caused confusion in the past: at Lucca and Pisa some of the trains leave from a platform labelled '1TO' or '1TE', meaning 1 Tronco Ovest (west) and 1 Tronco Est (east). This is *not the same* as Platform 1. All the 'through platforms' are labelled 1, 2, 3 etc., and 1TO and 1TE refer to separate 'terminus platforms' which you can find by walking to either the west or east end of Platform 1.

At Barga-Gallicano station you should find a TTI representative who will meet each Sunday train as required and take new arrivals to the Institute. If no-one is there you can wait in the station café - do call us if you find yourself waiting too long. Clearly we need to know in advance the time of the train on which you intend to arrive. The timetable is linked from the TTI web site, but all Sunday train times are in fact given in the table below. Note that the last train from Pisa is at 19:50 so it would be a good idea to arrive earlier in the day if possible (particularly if you want to enjoy the welcome buffet dinner at 19:30 - remember that staff members who have to pick up latecomers miss their dinner too!).

In emergencies - or if you arrive at an unusual time after the first day when our drivers might be busy - it is possible to get a taxi to Vallico Sotto from the station. In general this needs to be pre-booked - see the instructions on the web site (Barga Taxi : bargataxi@libero.it Tel. 331 3378051 or 339 5678336) but we can do this for you on request. If you are a non-Italian speaker who hasn't pre-booked and you need to talk to the guy (Massimo) on the phone you will find he doesn't speak English so just say (phonetic) "Taxi a Vallico Sotto da la stasjonay di Barga-Gallicano?" or similar down

a phone at him - the trip should cost around 35 Euro. Note that "I don't speak Italian" is "Non parlo italiano" - though that should be clear enough.

In case of problems contact Mike on his mobile - 00 44 7432 491113. (Additional emergency assistance may be available from Samantha Keil on 00 44 7979 554034 but she doesn't deal well with emergencies, so try to keep calm and pretend everything's alright - screeching or hyperventilating or anything like that would probably be counterproductive, even if the train's on fire). TTI has two direct phone lines (0583 761608 and 0583 1805441) which you should use as a last resort, since the people you want are unlikely to be standing next to them.

3 TRAIN TIMETABLES

See <http://www.trenitalia.com> and click the British flag at the top right. Note that if you use the Italian version then it's important to click 'Tutti i Treni' (all trains) in the red box since by default the train look-up thing only gives you 'Le Freccie' (superexpensive intercity fast trains) - excellent example of bad web design.

Sunday 3rd August - Pisa Centrale to Barga-Gallicano stations

dep. Pisa	arr. Lucca	dep. Lucca	arr. Barga-Gallicano
05:25			06:47
07:50			09:13
08:50	09:17	10:02	10:46
09:50	10:17	11:41	12:24
13:43			14:55
15:50	16:17	16:27	17:08
17:50			19:06
18:50	19:17	19:22	20:03
19:50			21:40

Sunday 10th August, Barga-Gallicano to Pisa Centrale station

dep. Barga-G.	arr. Lucca	dep. Lucca	arr. Pisa
06:40			08:13
08:03	08:48	09:42	10:13
09:39			11:09
12:06	13:00	13:12	13:43
15:23	16:10	16:42	17:13
20:26			22:13

OR

dep. Barga-G.	arr. Viareggio	dep. Via reggio	arr. Pisa
17:34	18:39	18:54	19:10

3.1 From Milano

People coming from more distant countries often only have a choice of coming to Milano airport. Here is a summary of advice for them.

Travel from Milano Malpensa airport to Milano Centrale train station:

The Malpensa Express train departs from Terminal 1 for Milano Centrale train station around twice an hour. (One can also get to other Milano stations Cadorna, Bovisa and Saronno but Centrale is the main train station where you need to catch onward trains. Note that the Malpensa-Centrale line only opened in 2010 so you may still encounter outdated advice that you need to travel to Cadorna from the airport). On weekdays, the first train departs Malpensa at 05.43, the last train departs 22.56. Journey time is around 40-50 minutes. Fare: 10 Euro one-way. Best not to get in a taxi as it will cost you 65+ Euro.

Travel from Milano Linate airport to Milano Centrale train station:

This smaller airport is much closer to the centre than Malpensa, and therefore it is feasible to use buses or taxis to get to the train station. See the Linate Airport section of <http://wikitravel.org/en/Milan> for details about the various

options.

From Milano Centrale train station to Barga-Gallicano

Sunday 3rd August 2014

From Milano Centrale as above. Then choose one of the following trains - the 08:10 and 13:10 are probably best since there is only one change, and no later train will get you to Vallico Sotto in time for dinner. (There are other possibilities, but they involve tricky 4 train connections, or getting up too early).

OPTION 1 - (from 34.80 EUR) *** - BEST

Milano Centrale	08:10	--> Pisa Centrale	12:21
Pisa Centrale	13:43	--> Barga-Gallicano	14:55

OPTION 2 - (from 48.30 EUR) *** - SECOND BEST

Milano Centrale	13:10	--> Pisa Centrale	17:10
Pisa Centrale	17:50	--> Barga-Gallicano	19:06

OPTION 3 (from 26.10 EUR)

Milano Centrale	14:05	--> La Spezia Centrale	17:22
La Spezia Centrale	18:09	--> Aulla Lunigiana	18:35
Aulla Lunigiana	19:18	--> Barga-Gallicano	20:25

OPTION 4 (from 24.80 EUR)

Milano Centrale	16:05	--> Viareggio	20:00
Viareggio	20:10	--> Lucca	20:27
Lucca	20:53	--> Barga-Gallicano	21:40

If you fly into Milano before Saturday, another option is to stay in a suitable hotel in Milano and take a train the day after.

Before you arrive, write down the details of suitable hotels near the station. There is a good site where you can book these and print out maps at:

<http://www.traveleurope.it/milano.htm>

or better still:

http://www.traveleurope.it/milan/milan_central_station.shtml

The Hotel Monopole seems a good one to me (prices from 60 EUR)

4 SPECIFIC TRAVEL PLANS

Jan Florian

Overnight bus from Brno (Czech Rep.). Arr Florence 06:45 Sat 2 Aug.

Train to Barga-Gallicano arr 14:56

Bargataxi to pick up and transfer to TTI.

Dep Florence 18:00 Sun 10 Aug

Shibing Chu

Already here - attending 'QMC in the Apuan Alps' workshop the week before.

Dep Sun 10 Aug am.

Lisa Johnson-Davies, Alex Haider

Already here - attending 'QMC in the Apuan Alps' workshop the week before.

Dep Pisa 16:30 Sun 10 Aug

Caterina de Franco

Already here - attending 'QMC in the Apuan Alps' workshop the week before.

Dep Sun 10 Aug. Train dep Pisa 11:45 am for Roma.

Neil Drummond

Already here - attending 'QMC in the Apuan Alps' workshop the week before.

Dep Pisa 12:45 Thu 7 Aug.

Ali Bagci

Arr c. 03:00 Sun 3 Aug. Train dep Pisa 05:25 arr Barga-Gallicano 06:47

Dep ??

Fatih Ersan, Yelda Kadioglu

Arr Bologna Sat 2 Aug. Hotel. Train as follows on Sun 3 Aug:

Bologna Centrale 11:20 Firenze SMN 11:55

Firenze SMN 12:10 Lucca 13:29

Lucca 14:12 Barga-Gallicano 14:55

Dep 07:00 Sun 10 Aug

Fan Wang

Arr Milano Malpensa 08:00 Sun 3 Aug. Train --> Barga-Gallicano 14:53

Dep Sun 10 Aug for 21:00 flight from Milano Malpensa

Thomas Whitehead

Arr Pisa 09:35 Sun 3 Aug. Train dep Pisa 13:43 arr Barga-Gallicano 14:55

Dep Pisa 16:10 Sun 10 Aug

Jiri Hostas

Arr Pisa 12:40 Sun 3 Aug. Train dep Pisa 13:43 arr Barga-Gallicano 14:55

Dep Pisa Sun 10 Aug

Wei Guo

Arr Pisa 12:40 Sun 3 Aug. Train dep Pisa 13:43 arr Barga-Gallicano 14:55

Dep Pisa 13:15 Sun 10 Aug

Braulio Brito

Arr Pisa 12:50 Sun 3 Aug. Train dep Pisa 13:43 arr Barga-Gallicano 14:55

Dep Pisa 13:14 Sun 10 Aug

Dmitry Zvezhinsky

Arr Barga-Gallicano 14:55 (train from Rimini)

Dep Pisa Sat 22:30 9th Aug

Christoph Reimann, Eike Caldeweyher

Arr Pisa 14:10 Sun 3 Aug. Train dep Pisa 15:50 arr Barga-Gallicano 17:08

Dep Pisa 14:45 Sun 10 Aug

Jan Jenke

Arr Pisa 14:10 Sun 3 Aug. Train dep Pisa 15:50 arr Barga-Gallicano 17:08

Dep Pisa 14:45 Sun 10 Aug

Giovani Rillo

Arr Barga-Gallicano 17:08 (train from Rome)

Dep Barga-Gallicano 12:06

Peter Townsend

Arr Pisa 16:05 Sun 3 Aug. Train dep Pisa 17:50 arr Barga-Gallicano 19:06

Dep Pisa 21:50 Sun 10 Aug

Thomas Mellan

Arr Pisa 16:05 Sun 3 Aug. Train dep Pisa 17:50 arr Barga-Gallicano 19:06
Dep Pisa 21:50 Sun 10 Aug

Katharina Doblhoff-Dier
Arr Firenze 19:25 Sat 2 Aug. Hotel. Train Firenze SMN 16:28 arr Pisa 17:28
dep Pisa 17:50 arr Barga-Gallicano 19:06
Dep Firenze 15:50 Sun 10 Aug

Saudi Woman, Minder of Saudi Woman
Arr Milano Fr 1 Aug.
Milano Centrale 13:10 --> Pisa Centrale 17:10
Pisa Centrale 17:50 --> Barga-Gallicano 19:06
Dep ??

Samuel Chang, Chorpure Chang (phone +41767989932)
Arr Sun 3 Aug pm by private car, c. 18:30
Dep Sun 10 Aug by private car

Sabri Elatresh
Arr Roma Fri 1 Aug. Train from Roma Termini Sun 3 Aug ??:??
Dep ??

5 ACCOMMODATION

TTI, ATTIC - one single mattress, one sofa bed
Mike Towler

TTI, NURSERY - one single bed
Jamie Towler

TTI, PLAYROOM - two single beds, one double bed
Neil Drummond, Peter Townsend

TTI, PINK ROOM
Samantha Keil, Saska Towler

TTI, LILAC ROOM - two single beds
Caterina De Franco, Katharina Doblhoff-Dier

TTI, TINY ROOM - one single bed
Yelda Kadioglu

TTI, RED ROOM - one double bed
Ali Bagci

TTI GARDEN ROOM, two single beds (bunk)
Lisa Johnson-Davies, Alex Haider

DOCTOR'S HOUSE, FIG TREE ROOM - one double bed
Kuang-Yu Samuel Chang, Chorpure Chang

DOCTOR'S HOUSE, UPPER TWIN ROOM - two single beds
Eike Caldeweyher

DOCTOR'S HOUSE, UPPER SINGLE ROOM - one double bed

Christoph Reimann

DOCTOR'S HOUSE, LOWER APARTMENT - one double bed, two single bunk beds
Saudi Woman, Minder of Saudi Woman

CASA FRANCA - ROOM 1 - 1 double bed
Shibing Chu

CASA FRANCA - ROOM 2 - 1 double bed
Thomas Mellan

CASA FRANCA - ROOM 3 - 1 double bed
Jan Jenke

CASA FRANCA - ROOM 4 - 1 single bed (attic)

CASA GIANPIERO - ROOM 1 - 1 double bed
Sabri Elatresh

CASA GIANPIERO - ROOM 1 - 2 single beds
Wei Guo

CASA LUCIANA - ROOM 1 - 1 double bed
Jan Florian

CASA LUCIANA - ROOM 2 - 1 single bed
Braulio Brito

CASA SARDA - ROOM 1 - 1 single bed
Dmitry Zvezhinsky

CASA GIOVANNI - ROOM 1 - 1 double bed
Jiri Hostas

CASA GIOVANNI - ROOM 2 - 1 double bed
Thomas Whitehead

CASA GIOVANNI - ROOM 3 - 2 single beds
Giovanni Rillo

CASA LIANA - ROOM 1 - 1 double bed
Sam Azadi

CASA LIANA - ROOM 2 - 2 single beds
Fatih Ersan, Fan Wang

CASA LONTANA - ROOM 1 - 1 double bed, 1 single bed

CASA LONTANA - ROOM 2 - 1 double bed

CASA LONTANA - ROOM 3 - 1 sofa bed

BEDOUIN TENT (vallico.net/tti/tti_tent.html)

DA SANDRA
(multiple commercial rooms/apartments available)
DA SANDRA - ROOM 1 - 1 double bed

DA SANDRA - ROOM 2 - 1 double bed

DA SANDRA - APPARTMENT 1 - 1 double bed

DA SANDRA - APPARTMENT 2 - 1 double bed (+ 2 children's beds if required)

CASALE DEI RUSCELLI (www.casaledeiruscelli.com)

(posh apartments for rich people requiring privacy - 10 min drive - car and extra payment required)

6 SUMMER SCHOOL VEHICLES

32 people, 42 seats

17-seat minibus (RHD) - Driver : Mike Towler

9-seat rental car (LHD) - Driver : Sam Azadi

6-seat Fiat Multipla (RHD) - Driver : Thomas Mellan

5-seat Peugeot 106 (RHD) - Driver : Fatih Ersan (only if necessary)

5-seat rental car (LHD) - Driver : Samuel Chang

SPARE DRIVERS FOR EMERGENCIES (please bring driving license):

Katharina Doblhoff-Dier

Fatih Ersan

7 THINGS TO BRING WITH YOU

- Notebook and pen.
- Your laptop, if you wish (though this is completely not necessary, as we have large numbers of them - see note in Technical Equipment section).
- Summer hiking gear such as boots, socks, mini-rucsacs etc.
- Italian plug converters if you want to plug anything in (we have some spare but probably not for all countries). Our sockets mostly have two round pins (with an optional third one between them). There are two types of thin prongs on European adaptors. You want the thinner of the two. Just to confuse things, there are also lots of English plug sockets into which English equipment can be plugged directly (including the majority of those in the lecture hall).
- Some Euros for spending in restaurants and shops (minimum 25 Euros per day). Please note that there is no cash machine within walking distance of the Institute, and although we might pass them from time to time on our afternoon trips, large numbers of people getting money out can cause considerable delays. There is a cash machine in Pisa airport to your left as you emerge into the arrivals hall (look under the escalator leading to the upper level). Go up the escalator to find an alternative cash machine if that one isn't working. A few years ago a cash machine was in fact setup in Fabbriche di Vallico a few kilometres away from the Institute, and it now usually works - this is where you should go if you run out of cash during the week (if you can't find it, find a local and say 'Bancomat?').
- People who intend to visit caves or canyons (most of you I hope) should bring some clothes/shoes that you don't mind getting wet.
- Climbing/caving equipment (harness, boots, helmet, via ferrata 'absorber', head torch) if you intend to take part in such activities and already have some (don't buy them just for this trip). We have a fair amount of gear we can lend but not enough for everyone.
- Sunscreen. It is likely to be quite hot in the first week of August, but note that because we are in the mountains occasional afternoon rain showers or even rain storms are not unknown.

- A towel
- Light sleeping bag (if you intend to sleep in the Bedouin tent).
- Hay fever tablets. Some students who have lived in darkened basements in huge cities most of their lives sometimes have difficulty with pollen when they come to live in the countryside.
- Swimming costume (if you want to go swimming).
- Earplugs - if you are sharing a room - to avoid being disturbed by snoring people.

In the tradition of events at this venue, you might also optionally like to bring

- A nice bottle of wine (or whatever passes for it in your country).
- An interesting thing

8 SUMMER SCHOOL SCHEDULE

Here is the proposed schedule for the Summer School. The main instructors are Dr. Mike Towler and Dr. Neil Drummond (Dr. Pablo López Ríos has sadly had to pull out this year), and they will be assisted by Sam Azadi. Some of the students may already have some experience with QMC: if that is the case, you are warmly encouraged to give a little ten-minute presentation of what you have done so far - contact us to arrange this. People are also welcome to bring posters of your work which can be attached to various flat surfaces in the monastery.

Note that the list of 'Possible Excursions' is intended only as a guide to typical things that might go on. What actually happens in the late afternoon of any given day is usually made up by MDT during the morning; he is always very open to suggestions and requests.

Sunday 3rd August

ARRIVALS

~7:30pm : Buffet dinner in the Institute garden.

Monday 4th August

8.30am : Mike Towler - "Quantum Monte Carlo : the basics. Overview of everything. Why QMC? Basic MC integration/VMC/DMC theory. Many-electron wave functions - aperiodic and periodic. Basic solid-state ideas - reciprocal space, k points etc. Idea of wave function optimization Representation of orbitals. Basis sets. Spin. Excited states. Total energy." (2.5 hours)

11.15am : Mike Towler - "An introduction to the CASINO program" (1 hour)

12.15pm : Mike Towler - "Distribution, setup and compilation of the CASINO program. Local and remote computer resources. How to apply for computer time on big parallel computers. Web resources. (MDT)

12:45pm LUNCH

PRACTICAL SESSION -

1.45pm-2.45pm : "Ask Neil + Mike" - QMC Q+A session. Advice on using QMC for your particular problems.

3pm EXCURSIONS

Trip to Alto Matanna. Four spectacular walks of varying difficulty. See the entire Versilia coast, Elba, Corsica and sometimes even France from the easily accessible summits of some of the more beautiful scenery in the Apuan Alps. Bring one of the Institute's

antique telescopes to watch the more courageous of you scale the 500 foot cylindrical barrel of Monte Procinto.

Followed by drinks and dinner in 19th Century Alpine hotel.

- Balloon station walk
- Monte Matanna walk
- Monte Procinto climb
- Grotta all'Onda walk (Neanderthal cave)

DINNER : Alto Matanna 0584 776005 (BOOKED FOR 32)

On return Mike and Neil will be available in the lecture hall to help with setup of CASINO on personal machines.

Tuesday 5th August

-
- 8:30am : Neil Drummond - "Jastrow factors and wave function optimization" (2 hours)
 - 10.40am : Mike Towler - "Statistical analysis of VMC results. Basic DMC - how to run a calculation. Stopping criteria: number of moves, target_error, small_error. How to extract and analyze DMC results. Serial correlation. Timestep optimization. Correlation time. Reblocking. Use of graphdmc script. Other statistical issues." (1 hour)
 - 11.40am : Neil Drummond - "Advanced diffusion Monte Carlo. Timestep errors. Green's function modifications. Fixed-node approximation. Wave function nodes. Fermion sign problem (release node and fermion Monte Carlo, optimizing the nodes). Expectation values in DMC. Future walking etc. Population explosions." (75 minutes)

1pm LUNCH

2pm PRACTICAL SESSION -
Basic use of CASINO program - simple VMC, DMC calculations (NDD)

EXCURSIONS

- Turrite di San Rocco canyon walk
- Tana di Cascaltendine + search for the Cave of the Fairies
- One hour walk around Barga countryside (then town centre). Optional swimming.

DINNER : Da Sandra 0583 761712 (BOOKED FOR 32)

AFTER DINNER : Vallico Sopra festival

Wednesday 6th August

-
- 08:30am : Neil Drummond - "Orbital optimization, multideterminants and backflow, with numerical results" (2 hours)
 - 10.40am : Neil Drummond - "Solid state calculations. Interactions and finite size effects" (1.5 hours)
 - 12.10am : Neil Drummond - "Applications : electron-only systems (fluid phase, Wigner crystals etc.) Electron-hole systems. (45 minutes)

1pm LUNCH

2pm PRACTICAL SESSION
- Wave function optimization with CASINO (NDD)

EXCURSIONS

- Walk Matanna to Monte Forato (rock arch) to Fornovolasco
- Tana che urla ('Cave that screams') exploration + optional cave hunting
- Grotta del Vento tourist cave
- Parco del Levigliese : supervised climbing and canyoning
- Fornovolasco church and flood frescoes
- Swimming at Bagni di Lucca

DINNER: Eremo di Calomini 0583 767020 (BOOKED FOR 32)

Thursday 7th August

-
- 08:30am: Mike Towler - "Applications : systems with atoms. Interesting calculations for big, complicated systems" (1.5 hour)
- 10.10am: Mike Towler - "Scaling with system size. Localized orbitals and localized basis sets (Gaussians/blips). All-electron calculations. Heavy atoms - timestep errors. Scaling with number of processors. Exploitation of parallel hardware. CUDA and exploitation of GPUs. Future trends in parallel computing. Embedding techniques. (1.5 hour)
- 12.00am: Mike Towler - "Introduction to other trial wave function generation with CRYSTAL, CASTEP, PWSCF, ABINIT, GAUSSIAN, ORCA, MOLPRO, GAMESS, TURBOMOLE, CFOUR, PSI4, MCEXX, ADF, JEEP/GP/QBOX, ATSP2K, 2DHF. Constructing an interface for your unsupported code." (45 minutes)

1pm LUNCH

PRACTICAL SESSION

- Trial wave function generation with external programs (CRYSTAL/PWSCF/CASTEP/ GAMESS currently planned to be available - please ask for others) (MDT)
- Advanced use of the CASINO program (MDT)

A DAY IN THE VILLAGE

- Relaxing, sunbathing, reading, studying, discussing
- Metal detecting
- The Vallico Sotto Game
- Abseiling to the Buca della Fate di Vallico di Sotto
- Football match - Vallico Sotto against the world/Vallico Sotto contro il mondo

DINNER : Provided by the ladies of Vallico Sotto (BOOKED FOR 32)

Friday 8th August

-
- 08:30am: Mike Towler - "Pseudopotentials for quantum Monte Carlo" (1 hr)
- 09:45am: Mike Towler - "Forces and derivatives. Dynamical calculations. Excited states, both for solids and big molecules. MCSCF for trial wave function generation. Efficient QMC evaluation of large multidet expansions. Expectation values other than the total energy computable with CASINO. Charge, spin, magnetic moment, fluctuations and covariances and the analysis of strongly correlated materials. Free energy etc. How to generate accurate potential models; GAP potentials. (2.5 hours)

1pm LUNCH

PRACTICAL SESSION

- General CASINO applications (MDT)

EXCURSIONS

- Orrido di Botri/Montefegatesi

- Lucca

7.30pm DINNER : Al Laghetto 0583 75798 (BOOKED FOR 30)

Saturday 9th August

MORNING

9.am : Talks by participants (feel free to volunteer)

9.30 am

Exercises with CASINO and QMC exam (with prizes)

AFTERNOON/DINNER

- Long distance excursion, probably to the seaside at Lerici/Portovenere

11.30 pm

Prize giving ceremony in the monastery garden.

Sunday 10th August

DEPARTURES

9 EXCURSIONS AND ACTIVITIES

Here is the list of excursions and activities generally offered at TTI. Clearly with the Summer School we have less time in the afternoons than is normal because of the need to run CASINO practical sessions so some of these excursions will no longer be feasible. Nevertheless we shall try to get through quite a few of them, according to the time available and the tastes and interests of the students.

The various activities are divided into categories according to the physical effort involved. As there are usually well over 30 people at the Summer School, it is envisaged the group may split into two, with the hot young muscular virile people doing the strenuous excursions, and the lazy, old and corpulent doing the more relaxed activities. What to do can be debated in the morning each day - all according to taste. Of course, as there will be multiple vehicles, we can do different activities simultaneously.

9.1 Very strenuous activities

- Climb the peak of Pizzo d'Uccello. Requires early start with no other activities (e.g. day before conference). See http://www.tcm.phy.cam.ac.uk/~mdt26/tti2/photos/pizzo_ducello.jpg. Enough said. They don't call it the 'Matterhorn of the Apuan Alps' for nothing.
- The ascent of Monte Procinto. This is a huge cylindrical rock tower with a belt of trees around its middle from which rise 500-foot walls, overhanging on every side. Michelangelo had the idea of carving it into a gigantic sculpture along the lines of Mount Rushmore but never got round to it. You can see the mountain here: <http://vallico.net/procinto.jpg> or <http://vallico.net/casinoqmc/wp-content/uploads/2014/01/procinto.jpg>. Yes - the walls are more or less vertical, but there is a *via ferrata* to clip yourself onto. Instruction, assistance, and the necessary equipment can usually be supplied - but we only have about eleven harnesses so bring your own if you have one!
- Reach the high peak of Pania della Croce from Piglionico (described as 'The finest peak in the whole of Italy' in *Below the Snow Line* - one of the 19th century books in the TTI Antiquarian Library). Also features in Dante's *Divine Comedy*. This defeated some of TTI finest mountaineers for several years before they finally succeeded in 2007 (note - it isn't that hard if you move quickly).
- Find the spectacular natural rock bridge of Monte Forato (under which someone once flew a biplane). Start from Fornovolasco (lots of up) or from Matanna (much easier) or even have two groups that meet in the middle and

exchange car keys. There is a fun via ferrata traverse on the way to the arch from Matanna, and we can also do a new route via Foce di Valli.

- Find the Neanderthal cave (Grotte all'Onda) down the slope from the balloon station near Matanna. *"This vast grotto stretches 40 x 60 meters and it originally hosted numerous internal tunnels, which are obstructed today. Its enormous cavity offers important evidence that suggests the frequency with which people entered the grotto, from pre-historical times to more recent periods. The first people to use the cave were Neanderthals; they hunted throughout the surrounding area and probably used it to hoard their tools and weapons, together with the bones of the animals they cooked. Hunters from the Superior Palaeolithic period (Homo Sapiens) lived in the more external part of the grotto where they set up a giant hearth. Later, Neolithic farmers and shepherds planted their huts in the shelter of the grotto's vast vault, carrying out their daily activities there during many seasons. This cave was also used during the Neolithic period (the Bronze Age), during which new models were developed for decorating ceramic. During this period, new raw materials, imported from distant locations, were adopted to make special equipment. From the post-Bronze Age until recent times, the grotto was not continuously frequented."*
- The *Geoscopia* web site – linked from http://vallico.net/tti/tti_mountaineering.html – shows precise locations of all of the thousands of caves in Tuscany (even the crap ones) together with a brief technical description and a plan of the cave. Interesting little expeditions may be made that have the aim of finding the entrance to particular caves, as well as exploring them. This is of course the most fun that a boy can have. The Apuan Alps have more caves than you can possibly imagine, so this will still be a viable activity in 2050. In particular, ask Mike about the untried Campolemisi, Fabbriche di Vallico, Motrone, and Antro della Paura expeditions.
- Explore the canyon of the Turrite di San Rocco river. This starts from the fork in the river upstream from Fabbriche di Vallico before you get to Gragliana. Take the left-hand fork. The aim is to go all the way through it to take coffee at the cafe near the Chiesa di San Rocco in Turrite. Be prepared to get wet - you basically can't avoid it. There are various natural swimming pools in there. Once reaching the village where the cafe is (there is also a children's playground and a nice river) you will have to bribe a local to give your driver a lift back via Focchia to your van. Or perhaps all your drivers drove a convoy out there beforehand, left most of the vehicles, and returned to the start of the canyon in a single car - use your initiative here.
- Morning workout. Run from the Institute each morning at 6am to the spectacular summit of Monte Palodina in order to tone up your thigh muscles and pep yourself up in preparation for the morning's talks. Mad people only.
- Complete the Cinque Terre coastal walk, a four-hour excursion through some of Italy's most spectacular scenery, or a similar walk near the famous seaside haven of Portofino.
- *Orrido di Botri* canyon walk. The Orrido is a giant canyon created by the Pelago river in the Apennines (about an hour's drive from the Institute) with deep steep walls as high as 200 metres and in some places only a few metres apart. This is a geologists' and naturalists' paradise. It can only be visited with helmets and suitable clothing you don't mind getting wet. There are some nice long walks in the country above the canyon (watch out for marmites and Royal Eagles - this is one of your best chances to contribute to the TTI Wildlife Photography expedition).
- There are of course any number of spectacular high mountain expeditions in the Apuan Alps and the Institute has a library of guidebooks which you can browse through. Let me know if you want to try anything else (that will fit in the clearly limited amount of time). There is also the TTI Antiquarian library (Mountaineering section) to inspire you.

9.2 Quite strenuous activities

- Go to Alto Matanna at the end of the Turritecava valley and visit the beautiful nineteenth-century hunting lodge that was once the destination for travellers in Rosetta the Balloon on her aerostatic cableway. See the old balloon station at Foce del Pallone and the extraordinary view. On clear days you can see Elba - 100 miles to the South - and sometimes the even more distant Corsica and the French Alps. Come back over the top of Monte Matanna and descend back to the lodge. Take one of the Institute's antique telescopes with you.
- From the Matanna hotel, climb up to the cross on the adjacent ridge for a spectacular view of Monte Procinto, Stazzema and the Apuan Alps. From there you can climb Monte Matanna the other way around, or visit the donkey and his little horse friends who live on the top of Monte Nona. Or you could go on a longer walk below the Giant West Wall of Nona, threading past Monte Procinto, and round the back of Monte Nona which will take several hours. Finish up the day with a fabulous dinner in the Matanna hotel.

- Take part in the latest expedition to the ancient cave known as the *Tana di Cascaltendine* which is the subject of Pietro Magri's 1880 book *An expedition to Mount Gragno and the Cave of Cascaltendine* as translated by Mike and available on the TTI web site (click the Local History Projects link). The 2007 summer school crew were able to photograph the result of the following quote : *'Before coming down from the cavern we used a chisel to inscribe our initials and the year 1880 on both walls of the passage near the entrance.'* This was done in the "Palace of Ismeno" which was the name Magri's group gave to an extensive cave whose entrance is a 6 foot hole about forty feet up a cliff - the full story is on the News from the Towler Institute blog here: <http://www.barganews.com/blogs/towler/?p=21>. It is also known that the cave continues for a kilometre beyond where we have penetrated before and this remains to be explored (note that in summer 2007, Mike and Evans went up the big wall in the final chamber with the dangling rope - a place many TTI visitors have visited before - with somewhat amusing consequences - see the blog story 'Bronze Hermaphrodites and the Fat Boy Filter': <http://www.barganews.com/blogs/towler/?p=28>). Expedition to be followed by cold beers and refreshments in the lovely village of Cardoso, or a circuit of Monte Penna hunting for the lost Cave of the Fairies..
- Visit the Selva del Buffardello adventure park:
<http://www.selvadelbuffardello.it/index.php?lang=eng>
I quote from their web site: *"Among the centuries-old fir trees some acrobatic forest paths, open to everybody, have been created and their aim is to show the wood from a different and adventurous point of view: hanging in the air. It is a challenge for children, youth and adults, who can test their ability with suspension bridges, swinging beams, vertical nets, ropes and obstacles, finding again their lost adventurous spirit. The Adventure Park 'Selva del Buffardello' in San Romano in Garfagnana (locality Pra' di Lago) is a real novelty in the Appennino Tosco Emiliano. An old wood of two hectares and a half in the heart of Garfagnana, near the natural 'Parco dell'Orecchiella', with a wonderful view on the Alpi Apuane and on the Fortezza delle Verrucole (old castle). The park entrance is free if you don't practise in the adventure paths."* We have never tried this, but it looks like great fun, even for grown-ups.
- TTI management has discovered that there is a secret underground tunnel in Vallico which starts from the Doctor's House next door to the Institute (a former barracks) and which goes up to the Rocchetta above the village (the site of an old castle on the summit of a little hill, where we now pitch the Bedouin Tent). This was used in mediaeval times for escape from the frequent warfare so common in these parts. The supposed entrance to the tunnel was bricked up (we think) in the 1930s - there are a couple of elderly men in the village who vaguely remember it. This summer we hope to unblock the entrance and explore. We also wish to find the upper entrance, so if you know anyone who has a ground-penetrating radar set we can borrow, let us know. This will probably be one of the next thrilling tales in 'News from the Towler Institute'.
- Explore the Vallico Sotto mule trail and the spectacular forgotten waterfall of Cascata Pendolina - one of the highest in Italy. Vallico was only connected by road to the outside world in the 1960s - before then people went up and down the *mule trail*. This has now been forgotten and is a little overgrown (though less so following TTI clearing activities) but is still very beautiful. Once we reach the bottom of the valley we will head over the river to the site of the Cascata Pendolina where will take lunch. On the way back the bravest people will try to ascend the *Canyon of the Pili* carved by the Rio Selvano (you will get wet!). EDIT: and they will fail - I have recently discovered the only way you can feasibly do this is to *descend* from the top. Apparently this canyon is quite famous - the Apians group from Castelnuovo organize tours through it. One of these days I will have to attach myself to one of these expeditions to learn how to do it. Apparently there are 12 major waterfalls to descend - photos and rough maps are linked from the Mountaineering page of the web site.
- Explore *Buca della Freddana* cave near the mule trail from Vallico Sopra to San Luigi. This was (re-)discovered by Mike in Easter 2007 following conflicting and confusing advice from several local old ladies who remembered its existence from 40 years ago. He has also found the upper entrance of the same cave on the summit of Monte Penna - the two are apparently connected by a 1 kilometre passage. The old ladies have advised us not to go inside because of the evil monsters and dark pits that lurk within, but then again, they always say that. Dare you explore?
- Five a side-football (a new fenced pitch was constructed in Vallico a couple of years ago) or regular football (on the local full-sized pitch).
- Rock climbing or low-level bouldering - the Institute should have some ropes and climbing equipment. I've read that there is good climbing near the Trombacco damn in the next door Fornovolasco valley - ask MDT for more

details. Don't forget to bring climbing boots and a harness that fits if you want to do this seriously (we have a rope you can borrow).

- Pietro Magri in his 1880 book mentioned above states that there are two other caves in Monte Gragno besides the Tana di Cascaltendine. Today no-one seems to know where they are. Having found the Buca della Freddana, Mike has narrowed down the lost "Cave of the Fairies" to a relatively small area. Can you find it?
- Traverse from Santa Luigi via Monte Palodina and the cliffs of Monte Gragno past the giant karst depression of Pian di Lago to the spectacular Rocca Estense fortress of Trassilico. Come back along the road past La Fornace.
- Explore the *Tana che urla* (the Cave that Screams!) - first explored and scientifically described by Vallisneri in 1726 - off the footpath to Foce di Petrosciano from Fornoalasco. This isn't a tourist cave suitable for your mum - so bring some appropriate clothes and torches. By the summer the Institute should have some proper speleological equipment to hand round. If you can read Italian, have a look at http://lnx.buffardello.it/images/file/DI_ALCUNE_GROTTE.pdf
- Go on a beautiful walk over the highest stone railway bridge in Europe to the church in Sambuca.
- Go wild boar hunting.
- Learn to play local sport *palla elastica* (elastic ball) with the village youths.
- Use TTI's two inflatable boats to play on the Turrtecava lake - accompanying picnic recommended. Have races. Try to find the Buca del Lago della Turrtecava (as you sail towards the dam, it is on the left just after the exit of the second road tunnel).
- Go kayaking on the Turrtecava. Bring your own canoe.
- Explore the ancient *Vasaio di Motrone* cave in the nearby village of Motrone (see http://www.apuane2007.it/italiano/vasaio/zona_vasaio.php).

9.3 Relaxed activities

- Visit the Pinocchio park, the Garzoni gardens, and the Collodi butterfly house in Collodi. See <http://www.pinocchio.it/park.htm>.
- The Opera Barga festival is usually on around the same time as the conference (but too early in July for 2014). Ask Mike in advance for tickets and reservations, or see: <http://www.operabarga.it/english/>.
- Look in the latest issue of Lucca "Grapevine" magazine in English for local cultural activities and concerts etc.. See <http://www.luccagrapevine.com/>
- Play with the Institute's Victorian Scientific Instrument Collection.
- Spend the afternoon bathing in the outdoor hot pool at the ancient thermal baths of Bagni di Lucca (one of the most fashionable spots in Europe in Lord Byron's time - the Switzerland of Tuscany!). Followed by shopping, sightseeing and coffee in the town centre.
- Samantha has two other favourite open-air pools at Galliciano and Barga. These are like little beach resorts where one lazes about on deckchairs and has the occasional dip.
- Watch the night sky through the Institute's astronomical telescope.
- Visit the ancient city of Barga (<http://barganews.com>) for an afternoon's relaxed sightseeing, shopping and culture.
- Visit the beautiful city of Lucca.
- Visit Castelnuovo di Garfagnana, where you can find Andrea's (the 'Indiana Jones of the Garfagnana') famous Osteria, where all day you can sample fabulous local wines, cheeses and snacks.
- Follow in the footsteps of Michaelangelo, and visit some of the Apuan Alps famous marble quarries.
- Day trip to Florence.

- Drive to the next valley along from ours over a spectacular high mountain road where the eagles live. Visit the Grotta del Vento - the Cave of the Winds (<http://www.grottadelvento.com>). This is the most famous cave system in Tuscany and the visitor will enjoy a spectacular and bizarre landscape of caverns and lakes. Take a pullover as the temperature is a reliable 10 degrees the whole year round. Then head down the valley to visit the *Eremo di Calomini* - an ancient monastery built into a high steep cliff.
- Table football and drinking in Fabbriche di Vallico.
- Horse riding at La Fornace.
- Various mild short walks around the Institute.
- Digging the Institute garden and doing little DIY things like restoring the church (I say this merely in hope..).

9.4 Very relaxed activities

- TTI has a high-definition video camera. Make a film of life at one of the world's best conferences.
- Budding archaeologists may use the TTI metal detector - bought following a recent spooky event when Evans and Mike were digging a hole in the ground for the satellite dish (I'm really not making this up): MIKE: Hey Evans, watch out for crucifixes when you're digging that hole. This used to be a monastery you know. EVANS (REACHING INTO THE HOLE) What, like this one? (HOLDS UP A THOUSAND YEAR OLD BRONZE CRUCIFIX FROM FIVE FEET DOWN). The crucifix is stored in the monastery in a secret place; please ask to have a look at it.
- Spend all day in the TTI garden relaxing in one of the Institute's three hammocks, drinking wine, snoozing or reading one of the books from the TTI library.
- The Institute has a variety of board games, jigsaws, and similar entertainments together with a number of Victorian books with titles like 'What To Do On Cold Winter Evenings Given That We Haven't Invented Television Yet'.
- Debate physics with the help of the Institute blackboards.
- Listen to one of Mike's lectures inspired by the contents of the TTI Antiquarian Library such as *Richard Burton and the Source of the Nile* (Burton the Victorian explorer and polymath, not the one out of *Where Eagles Dare*..) or *Up The Orinoco with Alexander von Humboldt*.
- Spa treatments in the Bagni di Lucca "Thermal resort".
- Mike is translating some chapters of a book on the history of Vallico Sotto. If he's finished it by the time you visit, then walk around the village looking at the buildings and places it describes.

9.5 General

- Volunteer to help clear overgrown local woodland paths (and also to repair some of the ones that collapsed in the great storm of November 2013). Mike can supply gloves and tools..
- The Institute has a wildlife photography notice board. Prizes for the best entries, particularly if you can take a picture of one of the eagles that regular soar above Vallico or of the elusive *marmite*.
- The Towler Institute Exploration Society also has some photographic challenges available - see the web site for details.
- Revitalize the economy of Vallico Sotto. It's barely 40 years since 450 people lived here. Now less than 100 do so. Just because modern lazy teenagers want to be fashion models smoking drugs in Milan rather than having a nice healthy outdoor life, the population of rural Italy has been denuded. Let's bring back the time when all the mountain terraces were in production, packs of nice mules helped carry things, teams of volunteers kept paths and bridges open, and everyone knew how to bake chestnut cakes. All serious suggestions gratefully received.

- After the forthcoming Carrington Event (http://en.wikipedia.org/wiki/Solar_storm_of_1859) when all electricity supplies have permanently failed (or some similar apocalyptic event), Vallico Sotto will be the ideal place to shelter from marauding gangs and to begin to rebuild civilization. The recent book ‘The Knowledge: how to rebuild our world from scratch, by Lewis Dartnell’ explains how to do this. As an exercise, and to help Mike prepare, see if you can figure out how to do some of the essential things that we will need (rig a water-powered electricity supply; find edible plants; make limestone mortar; fortify the monastery against enemy incursion; stuff like that). Buy it here: http://www.amazon.co.uk/Knowledge-How-Rebuild-World-Scratch-ebook/dp/B00H4EM594/ref=sr_1_1?s=books&ie=UTF8&qid=1400500727&sr=1-1

10 TTI TECHNICAL EQUIPMENT

There are various modern laptop computers in the Institute available both for general use and for CASINO practical sessions. Most offer some recent version of OpenSuse or Ubuntu Linux, with only a few left (those kept out of the hands of our anti-Microsoft activist Pablo) still able to dual boot into Windows XP/Vista/7. The practical sessions will be run under Linux. Though not really necessary you may bring your own laptop if you wish. It would help if you could set up a Fortran (95) compiler on it before arriving at the school (we recommend both GNU’s gfortran and Intel’s free ifort compiler - available for download on their website). If you’re a dedicated Windows user and you bring your own laptop, you also need to set up the Cygwin environment on it, see Q. A11 of the online FAQ: <http://vallico.net/casinogmc/faqs/>. Please be careful of the electricians when plugging in your own machine in order to avoid shorting out the projector etc. - in fact, it’s better to ask where to do so. Note that most of the available plug sockets in the lecture hall are of the *English* type, though some Italian ones are available.

All internet connections are made - via a dish on the roof - through a high quality wireless network (the TTI infrastructure was comprehensively upgraded in June 2014). In fact, because of the wide area covered by the monastery complex and because of its ancient 5 feet thick stone walls, there are actually 5 wireless networks on different frequencies (which cooperate and do some clever balancing tricks. The SSIDs are ‘TTI_Church’, ‘TTI_1’, ‘TTI_2’, ‘TTI_3’, and ‘TTI_5’ with a common WEP password ‘vallicochurch’. If any particular laptop appears not to be connected to the network, then right click on the wireless icon in the bottom left-hand corner (OpenSuse Linux) or top-right (Ubuntu) and click on the ‘TTI_Church’ connection.

Apart from computers and networking devices, we also have the following equipment available for conference participants to use:

- A HP Laserjet black and white printer (on a wireless print server at 10.0.4.10, so one can print from anywhere in the Institute). The relevant print queue is called ‘hp’.
- Canon Pixma ip4000 colour inkjet printer - at the back of the church directly connected to (usually) tti22.
- Sony photo printer for instant printing of your photographs (you can plug in your camera directly - no need to go through a laptop - accepts all memory card formats that I am aware of). Note that we have limited supplies of the expensive paper and ribbons, so try not to print off your entire collection.
- Epson Perfection 4990 scanner (usually upstairs in main building near MDT’s desk)
- A3 laminator
- Guillotine
- Digital camera
- A HD video camera
- Four or five USB memory sticks (labelled TTI)
- A supply of writeable CD-Rs, CD-RWs and DVD-Rs.
- The usual stationery and staples etc..

There are also a very large number of scientific and technical books which may be borrowed (top floor of the main building, and in the various bookshelves in the church).

Please note that there is also a pigeon-hole bookcase intended for printouts of ‘the literature’. At the moment this still contains all the relevant papers for ‘*21st-century directions in de Broglie-Bohm theory and beyond*’ - a huge conference we ran a couple of years ago, but it may be refilled with anything you like. You are welcome to borrow these papers, but please put them back in the same place you got them from as they are all carefully filed..

11 INTERNET USE

TTI laptops are mainly black/grey Sony Vaios with a few red Acer

Ferraris (note the difference in power supplies - the ones for the Ferraris have yellow ends, the Sony machines have black ones). All should connect themselves to the wireless network as soon as they’ve finished booting up.

All local machines have static IP addresses 10.0.4.2x on the TTI.Church network (where 2x is 20 plus the number of the machine - a red plastic label saying e.g. `tti_laptop9` implies 10.0.4.29) so they can all talk to each other via ssh or ftp etc. With appropriate software all the laptops can be run as a parallel supercomputer in the unlikely event of someone needing to do some QMC calculations with the link to the outside world cut off.

Other network details for administrators: TTI.Church network: IP 10.0.4.xx (static xx=10-99, DHCP assigned numbers from xx=102-254), Gateway 10.0.4.1, Primary DNS 8.8.8.8, Secondary DNS 62.94.0.1.. The router has a (password protected) web page at 10.0.4.1, the access point at 10.0.4.2. For the TTI_1, TTI_2, TTI_3, and TTI_5 networks, replace the 4 in the TTI.Church IP with 1,2,3,5... Other equipment attached to the network: a phone adapter, internet radio attached to TTI_1, a wireless print server (10.0.4.10, print queue ‘hp’), and possibly the NEC projector on DHCP. Do not assign your own static IP number on personal hardware without consulting MDT.

There is a central file server (a Synology DS1513+ 5 Bay DiskStation Desktop NAS with 10 TB of storage) attached directly to the main router box on 192.168.1.200. This will be used in the summer school to access common files via NFS.

Please be mindful of the needs of other users of the network. Although we have an excellent connection, it is clear that most people are now turning up with WiFi-enabled smartphones and tablets, and simultaneous use by up to 60 devices can in principle lead to certain issues.. The network was upgraded this year for precisely this reason, but it is gently suggested that downloading Gb of files, playing streaming music or videos through your smartphones, enabling automatic software updates, might not be a good idea.. Remember we’re in the middle of nowhere - it’s amazing that it works at all.

Note also that currently there is network coverage only in the main TTI building and garden, in the Luxury Bedouin Tent, and in the Doctor’s House, but not in any of the other houses we use for accommodation (Casa Franca, Casa Gianpiero, Casa Luciana, Casa Sarda, Casa Lontana, Casa Liana, Casa Giovanni).

The local network is normally configured to believe it is part of Cambridge University via their VPN service. This is very useful for e.g. accessing restricted content scientific articles. Sadly, Cambridge rules prevent us provided such access to TTI visitors, and so the VPN is normally turned off during conferences. Ask MDT if you want to make (indirect) use of this service.

12 PRESENTATION EQUIPMENT

The church is equipped with a good quality NEC MT1075 projector and an auxiliary Toshiba DPD TDP-T250U projector with DVI and regular RGB cabling . There is a giant 16’ by 12’ main screen, a 7’8 x 5’9 electric auxiliary screen, an Avervision document camera, a dual projection stand, a laptop, a DVD player with decent speakers, and various wireless control devices. There is a giant blackboard in the church and a smaller one in the lower main corridor of the main building stolen from the TCM Seminar room in the Cavendish Laboratory. There are two blackboards outside, and a portable one which can be taken on excursions if you wish to debate physics in restaurants or up mountains.

The NEC projector is wireless capable, so you can beam your talk from your laptop straight to it from anywhere in the room, as well as with old-fashioned direct connection (technical specs on the TTI website). The Institute projection laptop - though normally bootable into either Linux or Windows - will normally be running under Windows because Linux Powerpoint viewers mostly do not display Microsoft-generated files correctly. Obviously it will accept CDs and memory sticks and have the usual software such as Acroread and Powerpoint. On balance it is probably best to bring your talk on a CD or USB device or email it to MDT beforehand and he will ensure that it is on the projection laptop ready for your talk. We would be grateful if you could leave your talk on the Desktop of this machine so that your talk

can be made available (password protected if you request it) on the conference web page after you've all gone home.

The Avervision document camera is a sort of cool overhead projector. It will display any printed document, photo, slides, X-ray film or 3D object straight through the projector, so basically you can dissect a frog live on the wall. There is a Victorian microscope with an attachment that allows it to be connected to the Avervision, so biological people can project the microworld on the big screen. Although we have a table with a white square painted on it, non-electronic talks are probably better on white pieces of paper rather than on transparencies..

13 FOOD

In general breakfast will be taken in the Institute, lunch in the little bar in Vallico Sotto run by the lovely Monica, and dinner in some local restaurant (on all but one or two evenings outside the village).

In the institute some basic food staples will be provided which participants should feel free to fight over but in general you might like to buy your own food in the village shop run by the lovely and friendly Adelina. However sadly you can't because it closed in late 2007 - much to the consternation of all she relocated to a big new shop down in the main valley in Pian di Coreglia. To replace her, there are two food shops in Fabbriche di Vallico - a five minute drive downhill - and a giant Leclerc supermarket in Gallicano (twenty-five minutes drive). In principle there is also a tiny food shop in Vallico Sopra which seems to open 'on request' by ringing the bell, but I wouldn't rely on it.

To find the Vallico Sotto bar for lunch, go down the tunnel underneath the Doctor's house (the big house opposite the TTI church front door). Then take any path downwards until you get to the Vallico main square - the bar is just underneath that.. You are strongly encouraged to take your lunch here, as normally it doesn't serve food and Monica is doing us a big favour by buying food and preparing it - so we need to make it worth her while. Note you can also get beers, coffees, ice creams and so on here..

Note that people in local shops - or indeed anywhere round here - tend not to speak English, so learning some basic Italian food words before you come will help : *pane* = bread, *formaggio* = cheese, *prosciutto* = ham, *pomodori*=tomatoes, *birra* = beer, *vino* = wine, *caffè* = coffee, *latte* = milk, *grazie!* = thank you!

You are of course welcome to make use of the Institute's cooking facilities whenever you want. There is a big downstairs kitchen in the main building formerly run by a proper cook - who wrote the *Il Collegio Cookbook* whose recipes you are encouraged to try (it's in the little bookshelf in the kitchen). There are also two kitchens in the adjacent Doctor's house which will be rented for the duration of the conference, and similar facilities in most of the other houses.

On the first evening a simple buffet dinner will be provided. Later in the week the Institute's 16th Century pizza oven may be pressed into service. The rest of the time we will make use of the excellent local restaurants. When very large numbers of people are staying at the Institute, people are encouraged to break up into at least two groups, although many of them - especially Da Sandra - are large enough to handle everyone. Unless told otherwise, Mike will simply assume that you will be coming to each evening meal and will make bookings accordingly (generally a few weeks in advance). These bookings can be changed but please give Mike plenty of notice.

Finally, if you are a vegetarian - either for religious reasons or because you don't like being cruel to fluffy animals - you need to be aware that the locals will consider you to be certifiably insane and will feel very sorry that you are unable to enjoy their passion for delicious animal products of all kinds - particularly those made from parts of pigs. Don't worry about this. Following almost a decade of TTI activities, they are now used to us bringing strange foreigners to their restaurants and most are now able to supply vegetarian meals of some kind.

A FEW LOCAL RESTAURANTS

- Il Molino Vecchio (3401557521 or 3471447248, Fabbriche di Vallico)
- Da Sandra (0583 761712 or 3403730040 on the road between Fabbriche di Vallico and Vallico Sotto).
- Il Canapale (0583 761829, Vallico Sopra)
- Al Laghetto (near the lake at the entrance to the Turrtecava valley)
- La Rondine (0583 761751 Fabbriche di Vallico, open Fri evening, plus all day Sat/Sun)
- Alto Matanna (0584 776005, Matanna)

RESTAURANTS SLIGHTLY FURTHER AFIELD

- Circolo dei Forestieri, Bagni di Lucca
- Antica Trattoria dell'Eremita, Vergemoli
- Il Garfagnino, on the main road near Turritecava
- MANY MORE

SPECIAL RESTAURANTS

- La Buca di Sant'Antonio, Lucca
- La Mora, Ponte a Moriano
- Butterfly, Lucca

See also the TTI Restaurant Guide page on the website.

14 CINEMA VALLICO

The requirements of modern science presentations means the Institute church is also the only cinema in the whole of the Apuan Alps - a fact that local people very much enjoy (since the opening presentation of *Cinema Paradiso* in August 2005). During the conference you are welcome to use the projectors and it is expected that movies will be shown on several nights. The Institute has an extensive DVD library which you are welcome to browse. Feel free also to bring your own movies that you think we might enjoy.

15 NEWS FROM THE TOWLER INSTITUTE

MDT has on occasion written stories about events at the Institute and published them on the local Barga News website. See <http://barganews.com> and the "News from the Towler Institute" blog (or go to the TTI web site <http://vallico.net/tti/tti.html> and click on the relevant link in the left-hand column). So far these are mainly about cave explorations and similar adventures. However, Mike doesn't have a monopoly on this. If you wish to contribute your literary efforts then please send your stories about your adventures in Italy to him, and he will ask Keane the Editor to publish them on Barga News.

16 FOOTBALL MATCH: VALLICO SOTTO CONTRO IL MONDO

The thrusting young lads of Vallico Sotto have challenged the Rest of the World - i.e. you - to a game of 5-a-side football on the village pitch. This tradition - which we began many years ago - attracts a large crowd and we always get absolutely caned (even when I have had Brazilians and Spanish people available). Can a small mountain village with less than a hundred inhabitants continue to defy the other 6 billion of us? If you think you can stop them, please volunteer.

NONE YET

17 MUSIC

After many years of patiently accumulating musical equipment, we have now acquired enough that the TTI church can in principle be used as a professional concert venue. Participants with musical talents are therefore encouraged to demonstrate them..

Our stringed instruments include a basic acoustic guitar, an Epiphone EJ-200CE electro-acoustic guitar, a Line 6 Variax 500 electric guitar, an electric violin, and an antique 17th century violin (currently broken). Note the Variax 500 is a *modelling guitar* (i.e. internal electronics process the sound from individual strings to supposedly model or replicate the sound of specific guitars and other instruments.)

We have two keyboards: (1) a top-of-the-range-in-1995 and still pretty good Technics KN3000 keyboard, which is also our only source of drums, and (2) a beautiful red Nord Piano 2 HA 88 with triple pedal (MDT's pride and joy). This latter is one of the best available stage pianos (really, it's wasted on him) and despite his penchant for playing crude rock and roll songs, it's perfectly capable of having classical music played on it and sounding like a Bösendorfer Imperial Grand (not surprising, because it explicitly samples one, as well as things like Saloon bar honky-tonks). (<http://www.nordkeyboards.com/products/nord-piano-2>).

There are 3 microphones, 2 of good quality, including a retro-styled Shure Super 55 Deluxe used as a piano floor mike. For amplification there is a Yamaha Stagepas-300 PA system with built-in mixer with multiple inputs. The Nord Piano has a couple of quality Electrovoice ZLX-12P powered loudspeakers which can act as monitors (there is also a basic wireless in-ear monitor system). There is also a Line 6 guitar amplifier (with built-in effects), and an old 1990s Carlsbro keyboard amp (not recommended).

In his role of trainee Jerry Lee Lewis impersonator – limited by severe lack of time to practice – Dr. Towler has been threatening for years to attempt a full-on Fifties rock and roll concert (as detailed on the QMC web site at <http://vallico.net/casinoqmc/music/>). On payment of a suitable fee (such as a cigarette, which he only smokes during TTI meetings because of the stress), this might even happen - you never know. Anyone who might want to contribute a guitar solo or a backing vocal or even their own song should get in touch beforehand. Dr. López Ríos - who is actually a member of a proper band in Cambridge that plays in front of real people for money - is always happy to strum away on the guitar in the modern style. Dr. Neil Drummond is believed to be able to play the maracas, but we don't have any.

18 HEALTH AND SAFETY

We should all recognise that climbing, mountaineering and caving are activities with a danger of personal injury or death. Participants in these activities during their stay at TTI are asked to be aware of and accept these risks and be responsible for their own actions.

The nearest Accident and Emergency Department is 25 minutes away in Barga Hospital (car drivers should satisfy themselves as to its location on Google Maps) - other hospitals are in Lucca (50 minutes) and Castelnuovo di Garfagnana (45 minutes). The Italian emergency telephone number is 112.

Vallico Sotto is a mediaeval village built a thousand years ago on a steep slope with many steps, and naturally there no facilities whatsoever for the disabled; furthermore it seems that the builders of long ago have intentionally set traps designed to kill or injure you. However don't let this put you off; wheelchairs and so on can be manhandled up the hill with you in it if required, and of course we are happy to do this as a way of keeping fit.

TTI is a smoking venue and visitors may smoke as much as they like (ashtrays will be provided).

19 FINAL NOTE

Please address all queries to Mike Towler whose email address is mdt26@cam.ac.uk.

HAVE FUN AT THE SUMMER SCHOOL!