DOTTORATO NAZIONALE

Tecnologie per la ricerca fondamentale in Fisica e Astrofisica

M. Morandin
INFN- PD

Kick-off event of the
TFPA PhD course

10th-11th July 2024

Summary

- Introduction to the kick-off meeting
- Some notes on important PhD program aspects

The agenda - day 1

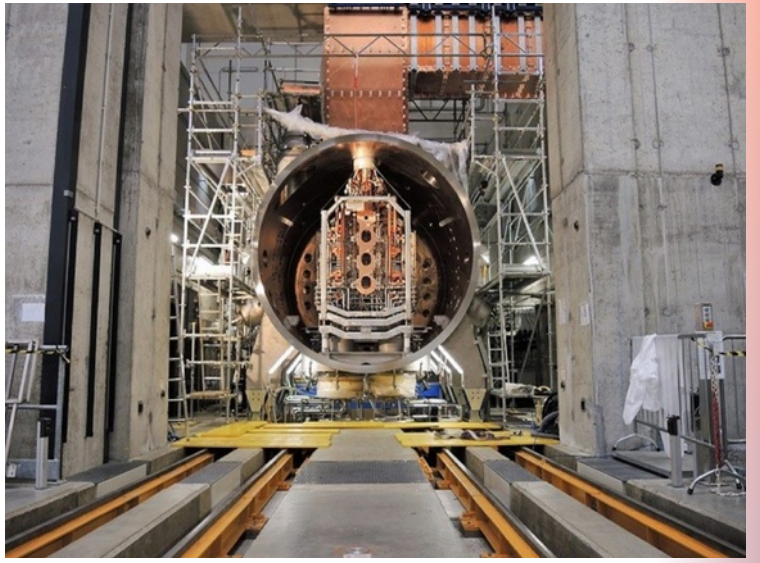
- The goals around which we formed the structure of this meeting are threefold:
  - give you a **first opportunities to meet all together and to know and interact with the people that have conceived and are implementing** the PhD program
  - to acquaint you with the **fundamental physics and astrophysics research environment**, seeking to illustrate the steps that lead from the **underlying questions that motivate research** to the need to develop technologies, in some cases, not already existing or available
  - to create an opportunity for you to provide **valuable feedback for improving this newborn PhD program**
- We have started with two opening talks about the PhD program

The agenda - day 1 (cont.)

- Then we get into the spirit and the meat of the meeting with:
  - two **introductory talks** designed to familiarize you with the **big scientific questions** that underlie current research in fundamental physics and astrophysics
- This will be followed by another couple of talks in which we will try to give you some **hints of how researchers today are trying to find answers to the questions evoked above** through:
  - the implementation of more and more powerful facilities and instruments
  - the analysis of the data produced
  - the organization of the efforts that require sometimes, the work of very large international collaborations

The agenda - day 2

- Tomorrow we are going to visit in the morning two **important research facilities** that are accessible in this area
  - the **RFX research center** on nuclear fusion, that is one of the main contributor to the big European effort aimed at demonstrating the feasibility of building and running a full scale fusion reactor: **the ITER project**
    - at RFX, an essential component of ITER is being built and will be tested: **the Neutral Beam Injector,** an accelerator capable of accelerating a 50 Ampere current of ionized atoms across a potential of 1 MV (50 MW of power), which is needed to heat up the plasma in the ITER tokamak
  - the **INFN Nuclear Laboratory in Legnaro**,
    - focus in on nuclear physics, particle accelerator and technological research. They house several advanced facilities, including the Tandem-ALPI-PIAVE accelerator complex and the SPES (Selective Production of Exotic Species) project for radioactive ion beams. This machine will provide unique opportunities both for science and for societal applications, in particular for the production of radionuclides for medical diagnostic and therapeutic use.



The agenda - day 2 (cont.)

- The afternoon session tomorrow will follow and will consist of three moments:
  - an **illustration of the technological developments taking place in INFN and INAF** that are necessary to develop the new tools we use, but also, at times, to transfer technologies to the benefit of external applications
  - a discussion with representatives of
    - companies who, as supplier of unique products for the Research Infrastructures have become **leaders worldwide** in their specific fields
    - a new local company born as a **spin-off** of our research environment
  - a final moment to report the results of the students' survey and **open the discussion** before drawing the final conclusions that will include a look to what is coming next for the our PhD program

The national Doctoral programs

- **National PhD programs** (or programs of national interests) **have been recently introduced** by the Italian Ministry of University and Research (2021)
- rather than being run by a single University, they are based on an a**ggregation of expertise** that benefits from **critical mass and national coordination**, **sharing resources and infrastructure among Universities, Research Institutions and Industry.**
- the objective is the creation of **networks of young researchers**, selected according to high standards and **trained on homogeneous and interdisciplinary research topics**, fostering the **bridge between academic and industrial research**, reducing fragmentation, contributing to make our Univerity and Research system, and therefore our country, more competitive internationally
- up to last year, **27 national PhD programs had been approved**, involving more than 1000 researchers of 77 Universities and 28 Research Institutions

Our PhD National program

- **Leading University** is the **University of Padua**
  - The University of Padua**, founded in 1222**, is one of the oldest universities in the world.
  - It is renowned for its research and education in various fields, particularly **science, medicine, and law**.
  - The university played a significant role during the Renaissance, **contributing to major scientific discoveries and advancements.**
  - Notable alumni include **Nicolaus Copernicus and Andreas Vesalius**, who made groundbreaking contributions to astronomy and anatomy, respectively.
  - The university is home to the historic Anatomical Theatre, the oldest of its kind, used for teaching anatomy since 1595.

The other key players

- **the Italian National Institute for Nuclear Physics (INFN)**
  - founded in 1951 to promote, coordinate, and conduct research in nuclear and particle physics in Italy, with strong interactions with the Italian Universities
  - INFN's research focuses on understanding the fundamental particles of the universe and their interactions, contributing significantly to the field of high-energy physics.
- the **National Institute for Astrophysics (INAF)**
  - established in 1999, INAF coordinates and conducts research in various areas of space science, from planetary studies to cosmology.
  - The institute focuses on advancing knowledge about the universe, studying celestial phenomena, and developing cutting-edge astronomical instruments and technologies.

Admission to the second year

- Procedure:
  - Sessions of **presentations in video-conference for each curriculum** will be organized in September 2024. Students will be asked to present:
    - the **R&D and academic activities** carried out so far
    - the **activities planned for the second year**, highlighting their consistency and coherence with the objectives to be achieved at the end of each individual PhD program
    - the sessions will be publicized and **all students will be encouraged to attend**
  - Dates of the sessions will be arranged before the end of July
    - please **let us know by tomorrow** if you already know about dates in September when it would not be possible for you to participate (mail to phdnazionale.dfa@unipd.it)
  - The Academic Board will then approve the transition of each student to the second year

The research budget

- what is it ?
  - each **doctoral student is allocated a budget** to support the research activities.
  - total amount for the three years of the fellowship: € 9,745.80
- what can it be used for ?
  - for **attending conferences, schools, seminars, university courses, etc.**
  - to **purchase consumables and tools for the research activities, such as a laptop computer**
    - inventoried items must be returned to the hosting institution at the end of the doctoral program
- how does it work ?
  - administrative procedures vary depending on the hosting institution; supervisor's approval is in general required for submitting the purchase request

Special procedure for travel expenses

- For these kind of expenses, it is mandatory to preliminarily obtain the **coordinator's approval**
- students have to submit the basic information to the PhD program coordinator (mose.mariotti@unipd.it) with the secretariat (phdnazionale.dfa@unipd.it) in cc:
  - Name:
  - PhD cycle:
  - Description and reasons for the trip:
  - Travel destination(s):
  - Departure and return dates
  - Estimated total cost
  - Funding
  - once got the coordinator's endorsement, one has to follow the host Institution administrative procedure to submit the request for using the available funds.
- start the procedure **well in advance**, as all authorisations must be obtained before you can leave

PhD students' internships

- the PhD program is subject to different regulations, depending on the source of the type of grant financial support:
  - **mandatory internships at Universities and scientific Institutions abroad** (6-12 months)
    - for PhD grants under the **DM117** (co-funding by companies, 1 in our case) and DM 118 provisions (grants on PNRR funds, 6 in our case)
  - **mandatory internships in industry** (6-18 months)
    - for PhD grants under the DM117 provisions
- otherwise both kind of internships are **optional, though recommended**
- both INFN and INAF have plenty of international high level scientific and technical collaborators
  - but, if not already done, **it is time to start planning**, especially the activities abroad
- the discussion with a few representatives of Italian companies will be a good **opportunity to discuss experiences, perspectives and expectations** regarding internships in industry

Authorizations for the internship abroad

- Authorization required:
  - for periods longer than 15 days: by the PhD program Coordinator
  - for periods longer than 6 months or for a total that exceeds 6 months : by the Academic or Executive board
- authoirization request form is available at: https://www.unipd.it/dottorato/modulistica-dottorati

Final comment

- We hope **you are going to enjoy** these two days in Padua
  - despite what the thermometers show us these days …
- The spirit in which we would like to conduct this event is to encourage **maximum interaction between us all**
- so please do not hesitate to **come forward with your questions and comments** and also after each presentation and during the coffee-breaks and the dinner later tonight