"ITER is a First of a Kind research facility where we are already encountering many technical breakthroughs"

Interview with Pietro Barabaschi I Director-General of the ITER Organization

Pietro Barabaschi

Pietro Barabaschi has been, since 2009, the Head of a R&D Department in Fusion-for-Energy (F4E), the European Joint Undertaking responsible to deliver European components to the ITER and Broader Approach Fusion international projects. He has been specifically responsible for the European contributions to the three projects implemented in the frame of the Broader Approach Agreement between Euratom and the government of Japan: JT60SA (a large tokamak), IFMIF/EVEDA (a large linear accelerator) and IFERC (a joint EU/JA R&D center). During 2015, and again in 2022, he operated as Acting Director of F4E being responsible for the overall management of the organisation, for the Project management infrastructure and for the implementation of reform measures implemented in the frame of the ITER Management. Before joining F4E and up to early 2006 he was the deputy to the Project Leader and head of the Design Integration Division of the ITER International Team at the Munich Joint Work Site. Soon after the university studies in Electrical Engineering he joined the JET Project, Culham UK, where he worked in the machine development department.

Pietro, 56, always worked in the field of Nuclear Fusion research, mainly in the development and construction of research infrastructures needed to make progress in the achievement of nuclear fusion as a viable energy source.

Congratulations to your new responsibilities as Director-General of the multinational ITER organization. What are your priorities for the organization in the run up to the completion for the ITER device?

The main objective is to work towards a better integrated team between the central ITER Organization and the Domestic Agencies in the ITER Members. This will increase the efficiency of the whole project. We also need to work on transparency with the Regulator and with the ITER Members. It needs to be understood that this is a research project and is a First of a Kind and therefore there will be unexpected events; the team is here to deal with these events but they should not come as a surprise.

Your background in fusion is long and broad. Can you tell us, what have been the major milestones of fusion research in the past 10 to 20 years?

There have been many developments in both physics and engineering; thanks to advances in computers we have understood the behavior of turbulence in the plasma much better for instance. An important point in the past 20 years is the decision to construct ITER and to launch an upgrade of JT-60 in Japan. Other publicly funded machines – such as KSTAR in Korea, EAST in China, and JET, the Joint European Torus based in Culham near Oxford – have made strong contributions to body of global fusion R&D. The arrival of many commercial start-ups in the fusion field shows that more and more people start to believe in this.

And concerning technical implementation, which were the major technical or conceptional breakthroughs achieved so far constructing ITER?

As said above, ITER is a First of a Kind research facility where we are already encountering many technical breakthroughs. The successful manufacturing of a large part of the toroidal field coils, the manufacturing of part of the vacuum vessel sectors, the manufacturing of most of the poloidal field coils are all technological breakthroughs by themselves.

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What are the most urgent scientific, what are the technical challenges which are worked on in magnetic confinement fusion globally?

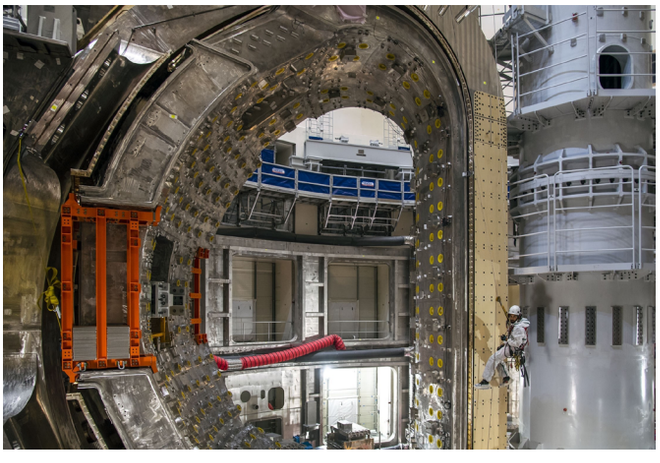
There are many concepts that are currently being developed both in the private and the public sectors; all these concepts will take time to mature and to be fully understood; although we have made many advances over the years, there are still things that we don't know. For example, we still face the challenge of efficient breeding of tritium fuel from lithium in the walls of the Tokamak; we continue to develop better materials for dealing with high temperatures and intense neutron flux; and we still need to understand how to transfer the energy from the high energy fusion neutrons to heat water and make

Above:
ITER in April 2022.

Below: First section of the ITER vacuum vessel in place.

Credit: ITER Organization.

steam in an efficient way. But as I just mentioned, at ITER we are already solving some of the engineering challenges related to manufacturing components of the necessary size and precision. Another challenge is the education of the next generation of fusion scientists and engineers. People who have worked their whole career in fusion (as I have) have seen great advances and we need to make sure that by the time we retire a next generation is ready to take our place; we need to work on this now.



In which areas do you see the most important needs of R+D with regard to the future prototype fusion power plant DEMO, which is already under development?

There are quite a few teams around the world that are working on DEMO designs; the one thing that they have in common is that they are all waiting for results from ITER. Also the smaller private startups are looking at ITER and are awaiting our results. The fusion effort around the world needs to work closely together to make these work for the benefit of mankind.

The work for ITER and DEMO focuses – for technical reasons – on large fusion power plants. Other fusion concepts aim for smaller generating units. In your opinion, will we see in fusion a similar competition of concepts as nowadays exists between small and modular vs. classical large fission power plants?

It is difficult to predict what will happen because many concepts are in the development stage at the moment. It would be great if there would be a choice between different concepts so that we can choose the best generating unit for each circumstance. At this moment it is more important that we get to a working generating unit and we will work very hard at ITER to make our contribution to this.

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Nicolas Wendler has been Head of Press and Politics at KernD since August 2013 (Nuclear Technology Germany e. V. / German Atomic Forum e. V.) and started his career in March 2010 as Policy officer. Previously he was an international consultant for the international relations of the Young Union (Junge Union) of Germany among other topics of energy, climate and economic policy for the organization. Since January 2022 he is also the editor in chief at atw. Wendler studied in Munich and Bordeaux political science and economics and (North) American cultural history.