# Nuclear data for energy applications: the experimental program at n_TOF (CERN)

Nicola Colonna

*Istituto Nazionale Fisica Nucleare – Sezione di Bari, Italy*

The dramatic climate changes cause by the still preponderant use of fossile fuels for energy production is making urgent to find alternative solutions based on carbon-free sources. In this respect nuclear energy can help meet decarbonization objectives in the medium-long term, provided that current issue that limit its exploitation are addressed and solved. In particular, a big step forward in the acceptance of reactors based on nuclear fission could come from the closure of the fuel cycle, with nuclear waste incineration in Generation IV reactors and/or Accelerator Driven Systems. On the other hand, the development of reactors based on nuclear fusion could finally lead to a safe, clean, economical and virtually inexhaustible energy source.

The development and operation of new generation fission reactors and of fusion systems requires new and accurate nuclear data, in particular on neutron-induced reactions. To this end, the neutron time-of-flight facility n_TOF at CERN is providing since two decades long-needed data on neutron-induced fission and capture cross sections of relevance for fission reactors, while an ambitious program on reactions of interest for fusion reactors has recently started.

In this talk the experimental program carried out at n_TOF of interest for current and future nuclear energy systems will be presented. After a brief introduction on the motivations at the basis of such a program, the main features of the facility will be discussed, together with an overview of the main detection setups used in the measurements. Finally, some of the most significant results of the experimental activity on energy applications at n_TOF will be presented and discussed.