**PhD in: Electrical, Electronics and Communication Engineering**

**Research Title: Design and test of an ASIC for the readout of the Cylindrical-GEM Inner Tracker of BESIII**

**Funded by**
Istituto Nazionale di Fisica Nucleare (INFN)

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**Context of the research activity**

The Italian National Institute for Nuclear Physics (INFN) is involved in a broad range of experiments in the fields of nuclear, high energy and astro-particle physics, usually carried-out in the framework of large international collaborations. In particular it takes part to the BESIII Collaboration whose Spectrometer is hosted by the Institute of High Energy Physics (IHEP) of Beijing on the e⁺-e⁻ BEPCII Collider. Recently the Collaboration decided to upgrade the current Drift Chamber Inner Tracker with a more robust and performing Inner Tracker composed of Cylindrical-GEM layers. Such a detector, highly innovative, requires also a performing and yet to be developed front-end electronics for its readout.

INFN is the leading Institution of those building such a new detector, an besides being involved in the design and construction of the mechanical parts of the detector and of its integration in the existing BESIII Spectrometer, is also the Institution responsible of the design and the construction of the ASIC needed for its readout.

The construction of this highly innovative and challenging detector has been recently supported by the European Commission that, within the framework of the H2020/RISE 2014 call, supports through the project BESIICGEM an International Consortium devoted to its construction, a Consortium constituted by Institutions from Italy, Germany, Sweden and China, lead by INFN and whose Coordinator is the PI of the BESIII group of the Turin INFN Section.
### Objectives

The research activity will focus on the design and validation of the ASIC for the readout of the BESIII CGEM Inner Tracker, and will be hosted by the Micro-Electronics Laboratory of the Turin INFN Section, where an International group, composed of Italian and Chinese experts and students from INFN and IHEP, is currently focused on these activities. At least two foundry runs for the prototypes are expected in the next two years; the test of these prototypes and the validation of the final ASIC will be key parts of the research activity funded by the present grant. The final goal is the installation of the readout electronics on the BESIII CGEM-IT and its commissioning within the end of 2017 or the first half of 2018.

### Skills and competencies for the development of the activity

The ideal candidate has an academic background in electronics engineering or applied physics, with strong skills in digital integrated electronics. Good knowledge of hardware description languages such as VHDL or Verilog and a good background in embedded system design would be an important asset. The applicant should provide also the following documents:

- declaration of the Institute of High Energy Physics stating that the applicant is attending the five-year combined Master-Doctor Program of the Institute of High Energy Physics of Beijing;
- master degree (or equivalent), if obtained, with the corresponding minimum average score of 65/100, or declaration of the Institute of High Energy Physics stating that the applicant has successfully passed all those exams foreseen for the first two years of such a combined program, with a minimum average score of 65/100, and/or that the applicant could apply in a Doctoral School in P.R.C..