

Bulgarian participation in Neutrino Research at CERN

Simona Ilieva
CERN and Sofia University St. Kliment Ohridski
RECFA Meeting
7 March 2025, Sofia

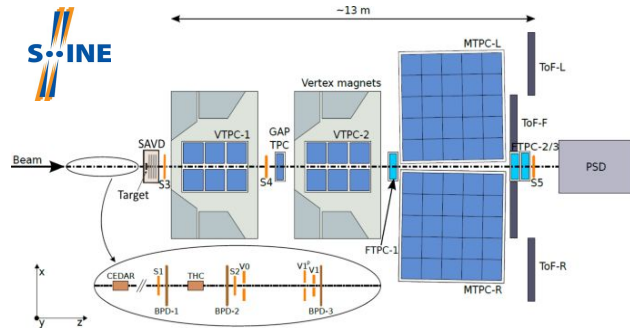
The Group

Current participants:

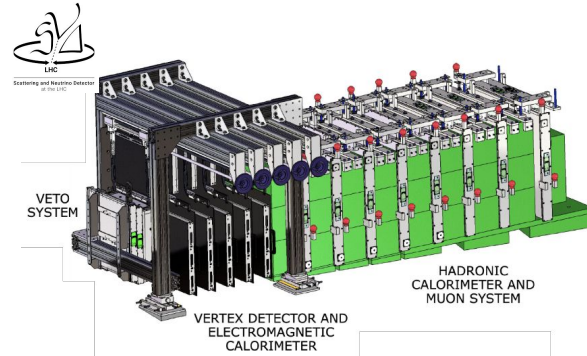
- prof. R. Tsenov (emeritus, fixed-term staff)
- assoc. prof. M. Bogomilov (permanent staff)
- assist. prof. G. Vankova-Kirilova (permanent staff)
- assoc. prof. D. Kolev (emeritus, fixed-term staff)
- G.Petkov, PhD (postdoc, fixed-term staff)
- S.Ilieva, PhD (physicist/researcher, on leave)
- V. Vergilov (physicist/researcher, permanent)
- two PhD students

The Projects

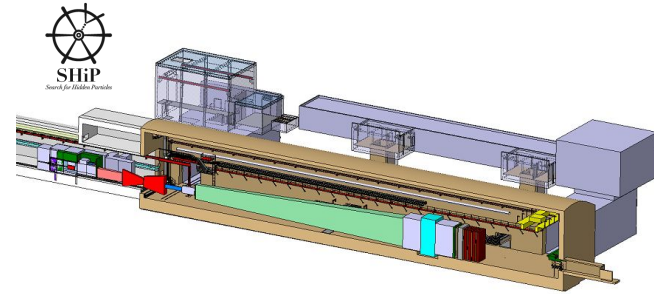
Participation in current neutrino and neutrino related experiments



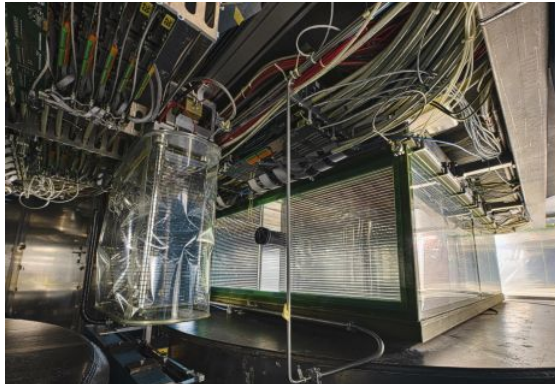
NA61/SHINE



SND@LHC

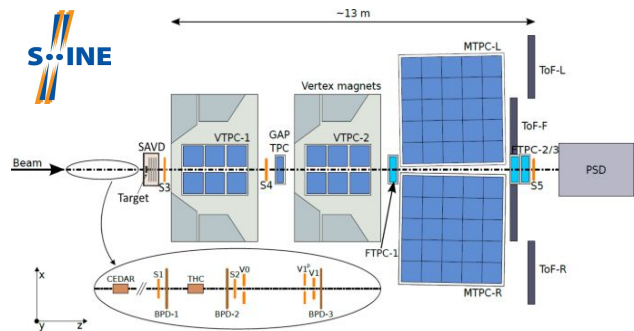


SHiP



The Projects

Involvement in Physics case - in bold

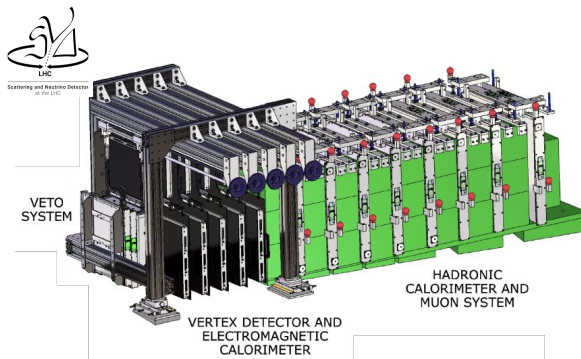


NA61/SHINE

The experiment is running since 2007

Hadron production measurements for long-baseline neutrino experiments in Japan and the USA - particle yields and production cross-section for T2K

Two more physics goals: strong interactions and hadron prod. measurements for cosmic ray experiments

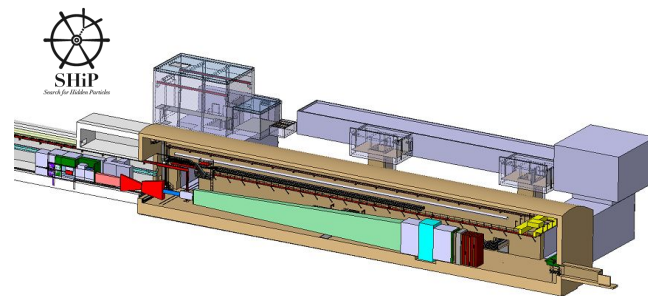


SND@LHC

Started data-taking in 2022

Background estimation, tracking for muon neutrino CC DIS

Neutrino production cross-section in pp collisions and dark matter searches



SHiP

The experiment was approved in March 2024

Technical design in progress

Detector R&D

NA61/SHINE: Resource, Personpower, Contributions

Currently the group consists of 2 permanent staff, 2 fixed term, no students.

Current participation in data-taking, collaboration meeting in Sofia was organised in April 2024

Contributions since 2017: 2009 and 2010 T2K replica target analysis - already published, software development, data-taking, hardware upgrade during LS2

All members are on the collaboration author list

The group joined NA61/SHINE from the start of the project back in 2003, following participation in its predecessor NA49

Funding through

- Before 2021: Bulgarian National Science Fund (grant DN08/11) and bilateral contract No. 4418-1-15/17 between the Bulgarian Nuclear Regulatory Agency and JINR
- After 2021: National Roadmap for Research Infrastructure
 - Covering Common Fund, travel and materials



NA61/SHINE Collaboration Meeting
15-19 April 2024
Sofia

SHiP: Resource, Personpower, Contributions

Currently the group consists of 2 permanent staff, one fixed term, one PhD student.

- Large overlap with SND@LHC - software, detector design

Participation in Monte Carlo studies for detector R&D

The group joined SHiP from the start of the project in 2013, project approved in March 2024

3 members are on the collaboration author list

Funding

- None yet
- Planned through the National Roadmap for Research Infrastructure



SND@LHC: Resource, Personpower, Contributions

Currently the group consists of 4 permanent staff, one PhD student.

Participation in data-taking, emulsion cloud chambers treatment, emulsion scanning, background estimation and analysis, software development

- Software and computing coordinator: S.Ilieva

The group joined SND@LHC from the start of the project in 2021, following participation in SHiP

4 members are on the collaboration author list

Funding through

- National Roadmap for Research Infrastructure
 - Covering Common Fund, travel and emulsion costs



SND@LHC Collaboration Meeting
11-14 June 2024
Lisbon

Summary

- Diverse experimental neutrino physics program realized at CERN
- A member institute of the NA61/SHINE, SHiP and SND@LHC collaborations
- Research topics:
 - Hadron production measurements for long-baseline neutrino experiments (T2K)
 - Tracking, background analysis, and R&D for neutrino searches
- Challenges
 - No engineers or technicians in the team
 - Lack of stable funding to cover the common fund contributions and travel, attract new researchers and keep members
 - No funds provided for 2024 through the National Roadmap, while it is expected to be the sole financial source in the future!