Petersburg Nuclear Physics Institute PNPI

High Energy Physics Division HEPD PNPI

240 physicists, engineers, technicians

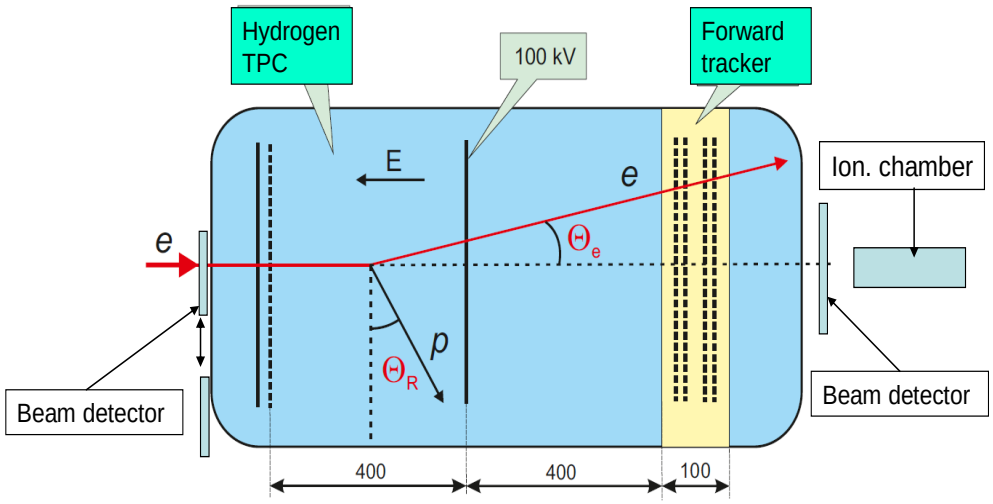
20 participants in COMPASS “ Proton Radius” experiment

HEPD PNPI is a pioneer in application of various options of the Hydrogen Active Target

- **Soft πp and pp scattering in the energy range 30 to 345 GeV.**
  Experiments WA9 and NA8 at CERN.
- **Matter distribution in exotic nuclei** Experiments at GSI
- **Muon catalyzed dd and dt fusion** Experiments at PSI
- **Muon capture by proton and deutron** Experimnts at PSI
- **Precision measurement of the proton radius in ep scattering**
  Project of experiment at MAMI Mainz

PRECISION MEASUREMENT OF THE PROTON CHARGE RADIUS IN ELECTRON PROTON SCATTERING

Experiment under preparation at MAMI Mainz for 2020



Measured quantities:

Recoil energy T_R

Recoil angle Θ_R

Vertex Z coordinate

Electron scattering angle θ_e

$$-t = \frac{4\varepsilon_e^2 \sin^2\frac{\vartheta}{2}}{1+\frac{2\varepsilon_e}{M}\sin^2\frac{\vartheta}{2}}$$

$$-t = 2MT_R$$

Recoil proton method Hydrogen high pressure TPC

Similar TPC is proposed for the COMPASS Proton Radius experiment