

QCD Theory and Lattice QCD: Pedro Bicudo et al.; Orlando Oliveira et al.; ...

QCD Theory, Covariant Spectator Theory applied to hadron spectroscopy: Teresa Peña, Alfred Stadler et al.; ...

QCD experimental, proton Spin Structure: COMPASS Collaboration @ CERN

QCD experimental, meson structure, proton charge radius, light and strange sector
Meson spectroscopy: AMBER Collaboration @ CERN

Quarks and Gluons in Extreme conditions phenomenology and theory: Guilherme Milhano, Liliana Apolinário et al., ...

Quark Gluon Plasma experimental: HADES @ GSI, will be followed by CBM @ FAIR; ATLAS and CMS Heavy Ion groups @ CERN

The portuguese Hadron Physics Community is diverse, integrates the main european and worldwide networks in the field, and explores already synergy opportunities among groups for experiment / theory / phenomenology.

Some of the main unanswered fundamental questions of Particle Physics concern QCD and the Strong Interactions:

- Origin of mass
- Confinement
- Quark Gluon Plasma

Recent theory progresses in ab-initio calculations to understand the non-perturbative running masses of quarks and gluons; and experimental indications confirming saturation at IR limit.

Lattice QCD results already at the physical pion mass, but also discrepancies observed.

Phenomenological approaches that include both experimental and lattice results.

Present and Future of Hadron Physics

JLab 12 DIS, SIDIS and DVCS data
JLab 12 baryon spectroscopy
LHCb @ CERN
COMPASS polarized SIDIS data
COMPASS polarized Drell-Yan data

Exotics and hadron spectroscopy
TMD PDFs
GPDs

From 2022: AMBER @ CERN

Meson PDFs; Proton radius; ...

From 2028 (?): CBM @ FAIR

QGP

From 2029: LHCspin @ CERN

Proton spin structure

From 2035 (?): EIC @ USA (RHIC) and EICC @ China → proton spin structure

Other possibilities, at unknown/longer term: JLab 22 @ USA and PANDA @ FAIR