



**STRONG2020 'The strong interaction at the frontier of knowledge: fundamental research and applications'**

**WP20: Fixed-target experiments at the LHC (FTE@LHC)**

*Cynthia Hadjidakis, IPN Orsay*

*FTE@LHC and NLOAccess STRONG2020 joint kick-off meeting*

*CERN*

*November 7-8, 2019*



## STRONG2020 kick-off meeting at Nantes

<https://indico.in2p3.fr/event/19715>

- Horizon 2020 is the European programme for research and development during 2014-2020
- Call INFRAIA-01-2018-2019
- FT@LHC: 1st proposal written October 2017 (two proposals for FT@LHC)
- STRONG2020 'The strong interaction at the frontier of knowledge'
  - Barbara Erazmus (Coordinator): IN2P3/SUBATECH (France)
  - June 2019 - May 2023
  - 10 M €
  - 32 WPs (27 project accepted, 12 original projects merged in 5 WP)



## WP20: Fixed-target experiments at the LHC (FTE@LHC)

- Spokespersons: Pasquale di Nezza and Cynthia Hadjidakis
- Merging of two proposed WP
- WP objectives:
  - Investigation and implementation of high-luminosity fixed-target experiments with ALICE and LHCb detectors
  - Develop new theoretical ideas (rare events, large rapidities, ...)
  - Quantify phenomenological opportunities with ALICE and LHCb in fixed-target modes
  - Benchmark selected observables using realistic simulations
- Three tasks defined:
  - Task 1: Feasibility studies in ALICE (gas and solid target)
  - Task 2: Gas-target development in LHCb
  - Task 3: Phenomenological and theoretical studies
- Reporting every 18 months

## 3.1.2 TIMING OF THE DIFFERENT WORK PACKAGES AND THEIR COMPONENTS

Work package number	JRAX															
Work package acronym	FTE@LHC															
Work package title	Fixed Target Experiments at the LHC															
TASKS/Subtasks	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>TASK 1: Feasibility studies in ALICE</b>																
1.1 Gas-jet target implementation																
1.2 Solid target implementation and study of its material budget																
1.3 Detector performance with a shifted vertex																
1.4 Full simulations of selected processes with the ALICE setup																
<b>TASK 2: Gas-target development in LHCb</b>																
2.1 Design and construction of the unpolarised target																
2.2 Standalone tests on on gas polarisation and dissociation																
2.3 Design of a new polarized gas target																
2.4 Detector performance with a shifted vertex																
2.5 Luminosity determination improvement based on SMOG data																
2.6 Full simulations of selected processes with the LHCb setup																
<b>TASK 3: Phenomenological and theoretical studies</b>																
3.1 Threshold resummation for W production at large $x$																
3.2 Transverse single-spin asymmetry for novel processes																
3.3 Gluon and charm distribution in the proton at large $x$																
3.4 Nuclear pdfs and gluon EMC in the nuclei at large $x$																
3.5 ChiC indirect production in heavy-ion																
3.6 Drell-Yan factorization breaking in Pb-A collisions																

*(Timelines are indicate in grey, milestones with black boxes)*

### **Deliverables (brief description and month of delivery)**

- Mechanical integration of an internal solid target in ALICE [internal report to the Collaboration - m24]
- Design of gas-jet implementation in ALICE [peer-reviewed paper – m18]
- Improve track reconstruction and study detector performances in ALICE for various target positions [software, simulations and internal reports – m36]
- Installation of the unpolarised gas target into LHCb [internal report – m18]
- Improve track reconstruction, detector performances and dedicated HLT triggers in LHCb [softwares, simulations and internal reports – m36]
- Design of the polarised gas target for LHCb [internal reports – m48]
- Phenomenology and theory papers for high-x, spin and QGP physics [peer-reviewed papers – m24,27,42 and 48]



- LHCb:
  - PhD Santiago (1.5 year+local funding): start in Nov. 2019 (LHCb + pheno)
  - PhD Ferrara (1.5 year+local funding): start in Nov. 2019 (LHCb)
  - Postdoc LNF (2 years): expected in March 2020 (LHCb)
- ALICE:
  - Postdoc WUT (2 years): start in Jan. 2020 (ALICE)
  - Postdoc IPNO (1 year+local funding): expected in Feb. 2020 (ALICE)
- Pheno:
  - Postdoc NCBJ (1.5 year+local funding): expected in early 2020 (pheno)
  - Postdoc Lisbon (1 year+local funding): expected in Jan. 2020 (pheno)

- Pheno studies: what would be the most useful for motivating FT@LHC?
- High-x physics: FT pseudo data and impact on pdf and npdf in arXiv:1807.00603, impact on charm distribution?
- Spin observables: TSA and impact on TMDs?
- QGP observables: Drell-Yan in AA (factorization), chic production in AA, ...
- Others?



## FT@LHC: annual workshop

- Annual workshop on FTE@LHC
- November 2019: CERN
- 2020: Les Houches? Trento? CERN?





## CERN Transnational access: call for 2019-2020 requests

- 1) Beam-tests & irradiations at PS/GIF++/IRRAD/... facilities (this concerns mostly the STRONG2020 Instrumentation WPs).
- 2) Participation to experimental runs of officially approved fixed-target experiments (this mostly concerns COMPASS, FT@LHC,... experimental activities).
- 3) Participation to STRONG2020 meetings, workshops, conferences,... (this mostly concerns to all of WPs above, plus all WPs related to both experimental and theoretical LHC activities).

Request for support (per-diem of 138 CHF/day~120€/day):

- (i) motivation (based on points 1), 2), or 3) above)
- (ii) needs in term of number of days
- (iii) number of people of your WP that may need potential access at CERN for the remaining of 2019 and 2020