



‘The strong interaction at the frontier of knowledge: fundamental research and applications’

TRANSNATIONAL ACCESS (TA7) : CERN

David d’Enterria

CERN

STRONG-2020 Kick-off meeting

October 23-25, 2019

- 0 CERN in STRONG2020 : LHC/SPS physics (EXP/TH), PS, GIF++, IRRAD (exp)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824093.

TA7- Objectives

Transnational access to CERN

- Provide access to CERN facilities (PS/GIF++/IRRAD beam-test & irradiations, fixed-target exp. runs, meetgs, workshops,...) to (mostly) high-energy WPs:

High-Energy Frontier

- **VA-NLOAccess:** Extension of the well-known MadGraph automated on-line code for the novel computation of perturbative QCD cross sections in high-energy hadronic collisions (i) at next-to-leading- order (NLO) accuracy, (ii) using meson and heavy-ion beams, and (iii) for quarkonia final-states.
- **VA-3DPartons:** Development of a new combined framework to extract generalized (GPDs) and transverse momentum-dependent (TMDs) parton distributions, with higher-order fixed and twist corrections, from fits to experimental e-p and p-p data (handled in a Rivet-like format).
- **JRA-GPD-ACT:** Extraction of GPDs from new high-precision QCD analyses of novel high-statistics e-p and p-p measurements at fixed-target and collider energies.
- **JRA-TMD-neXt:** Extraction of unpolarized and polarized TMDs and parton fragmentation functions (FFs) from new high-precision QCD analyses of novel high-statistics measurements at e+e-, e-p and p-p at fixed-target and collider energies.
- **JRA-next-DIS:** Development of new Monte Carlo tools and studies of benchmark channels, for e-A collisions at future deep-inelastic experiments (Electron-Ion Collider, EIC). Optimisation of associated detector designs for high-resolution tracking, vertexing, photon, and PID.
- **NA-Small-x:** Extraction of high-precision nuclear parton distribution functions (nPDF) through global fits including the latest LHC p-A and A-A data. Extension of current gluon-saturation calculations (CGC, KLN, TMD...) to NLO accuracy with resummation corrections, for observables with three jets and with heavy-quarks. Calculation of multi-particle correlations issuing from initial-state PDF effects to separate them from final-state hydrodynamic effects in small

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High-Energy Frontier

- **JRA-FTE@LHC:** Development of novel gas-target techniques to be able to carry out the most energetic fixed-target collisions ever performed in the lab, using the LHC beams at ALICE and LHCb. Evaluation of the novel expected constraints on PDFs at high-x in the proton and nucleus, parton spin dynamics, as well as QGP properties via unique quarkonia measurements.

- **NA-Jet-QGP:** Development of novel experimental and theoretical techniques for jet physics in A-A collisions, providing a reference implementation of jet interactions in a QGP via a full heavy-ion Monte Carlo (MC) event generator. Definition of new observables and development of new tools (based on quark/gluon jet substructure variables via machine-learning techniques) with increased sensitivity to the physical mechanisms involved in jet-QGP interactions.

- **NA-HF-QGP:** Extraction of QGP transport coefficients from new high-precision theoretical calculations and experimental measurements of the production of open and closed heavy flavour (HF) quarks (charm and beauty) in A-A collisions at the LHC. Accurate measurements of total c-cbar, b-bbar cross sections in p-p, p-A and A-A collisions. Development of a new data-theory interface (with a Rivet-like standard format) to compare event-by-event experimental results to MC predictions.

- **JRA-LHC-Combine:** Combination of key LHC (ALICE, ATLAS, CMS, LHCb) measurements in p-p, p-A, and/or A-A collisions to achieve high-precision constraints on nuclear PDFs, QGP properties, SM parameters, and/or searches of physics beyond the SM. Examples include gauge bosons and jets differential cross sections to constrain nPDF, light-by-light scattering to constrain new physics (axion) searches, open charm or bottom hadron cross sections to determine QGP transport coefficients...

Low-Energy Frontier

- **JRA-HaSP:** Development of a common data-theory analysis framework to determine exotic hadrons properties (new mesons and baryons, onia, dibaryon, multi-quark, glueballs, hybrids...) by fitting new experimental data (MAMI, TJNAF, BESIII, COMPASS, LHCb and ALICE at CERN) to lattice QCD and effective-field-theory predictions.

Maybe also : JRA-PrecisionSM, NA-PREN, NA-lattHadrons ?

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- **JRA-MPGD_HP:** Development (up to the prototype stage) of new gas detectors with improved capabilities in tracking, charged particle identification, photon detection, and timing in the picosecond region, capable of operating under very high beam intensity conditions.

- **JRA-TIIMM:** Development of new silicon detectors based on Monolithic Active Pixel Sensors (MAPS) for high-precision tracking, and energy loss measurement for advanced particle identification.

- **JRA-ASTRA:** Development of beyond state-of-art radiation detectors based on semiconductors (Cadmium Telluride, Cadmium Zinc Telluride) able to perform high-precision measurements of X-ray and gamma-ray photons in different environments/conditions.

- **JRA-CryPTA:** Production of polarized nucleon targets (at the prototype level) using solid state materials combined with superconducting high-field magnets and the Dynam Nuclear Polarization method.

- **JRA-CRYOJET:** Development of cryogenically-cooled cluster/pellet/microjet sources to be used as targets in a variety of collision setups (storage ring experiments, electron accelerators, or laser-driven hadron accelerators).

- **JRA-SpinForFAIR:** Optimization of the polarization of protons and antiprotons beams and targets for the GSI/FAIR storage ring.

- **JRA-P3E:** Optimization of high-intensity polarized electron and positron beam sources, and full design of the Hydro-Møller polarimeter detector using high-voltage monolithic active pixel sensors (HV-MAPS).

- A total of ~17–19 (out of 23+2) WPs are concerned.
- If your WP appeared above : Please inform me if you expect any access of people at CERN during 2019 (Nov.-Dec.) and 2020.

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TA7- Budget Transnational access to CERN

- TA7 CERN access is the 9th highest STRONG2020 budget : 200.000€



No	Beneficiary	Budget
1	CNRS	2 156 500,00 €
2	OEAW	92 000,00 €
3	UCL	100 000,00 €
4	CERN	200 000,00 €
5	DKFZ	17 500,00 €
6	FAIR	61 590,00 €
7	FZJ	456 000,00 €
8	GSI	620 875,00 €
9	JGU MAINZ	1 060 750,00 €
10	UBO	531 000,00 €
11	RUB	105 500,00 €
12	UHEI	22 910,00 €
13	TUM	106 250,00 €
14	UHAM	52 500,00 €
15	UREG	51 250,00 €
16	WWU	128 125,00 €
17	UAM	38 750,00 €
18	UCM	27 000,00 €
19	USAL	26 000,00 €
20	USC	112 500,00 €
21	UPV/EHU	36 000,00 €
22	UVEG	81 500,00 €

No	Beneficiary	Budget
23	JYU	71 250,00 €
24	CEA	478 500,00 €
25	RBI	25 000 €
26	UNIZG	32 500,00 €
27	TCD	36 250,00 €
28	CNR	40 000,00 €
29	FBK	400 000,00 €
30	INFN	1 813 250,00 €
31	POLIMI	35 000,00 €
32	UOM	36 000,00 €
33	RUG	47 000,00 €
34	Nikhef	98 750,00 €
35	NCBJ	55 000,00 €
36	WUT	50 000,00 €
37	IFJ PAN	35 000,00 €
38	UJ	25 000,00 €
39	LIP	188 500,00 €
40	UAVR	34 000,00 €
41	UU	160 750,00 €
42	UOB	62 500,00 €
43	UEDIN	64 750,00 €
44	UGLASGOW	126 500,00 €

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TA7- Budget & HOWTO Transnational access to CERN

- TA7 CERN access is the 9th highest STRONG2020 budget : 200.000€
- TA7 pays ONLY a per-diem of 138 CHF/day (~120 €/day) per person.
Flat rate : no trips payed, no need to justify hotel/meal expenses,...
- Roughly this budget is equivalent to having 15 people receiving 120€/day during 2 days at CERN every month for the 4 years of STRONG-2020.
- Beam-tests/exp.runs: Previous approval in relevant CERN committees needed
- How this will work technically :
 - WP PI sends me (dde@cern.ch) the dates & list of people who need access (hopefully mostly CERN users already, if not: treated as externals)
 - I pass the list to CERN administration with the per-diem request.
 - (CERN hostel booking, if needed, can put my name as local guarantor)
 - CERN users receive the total per-diem in the bank IBAN indicated in their edh.cern.ch account. Non-CERN users to be contacted to provide IBAN.

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TA7: Update on progress

- A first meeting (FTE-LHC and NLOAccess) with ~15 people over 2 days will take place at CERN in 2 weeks from now :

On 9/26/19 9:38 PM, Jean-Philippe Lansberg wrote:

Salut David, cc à Cynthia,

Comme je t'en avais parlé, nous allons organiser un petit meeting STRONG 2020, cible fixe + NLOAccess au CERN les 7-8 novembre.

Il nous semble que si on peut bénéficier d'un support de max 15*2 jours/nuits, cela permettra de soutenir la plupart des besoins. En terme de coût effectif pour le CERN, je ne sais pas trop ce que cela donne.

Comment procède-t-on ? C'est le CERN qui va prendre en charge 2 nuits par participants ?

Amicalement,

Jean-Philippe.

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- A deliverable “Transnational Access provision - multi annual implementation plan over the first 18 months” is due for M18 (November 2020)
- Advancement
- Expected delivery date