

COLLABORATION AGREEMENT

IN2P3 - COPIN

I. Identification of the laboratories

Partner	COPIN
IN2P3 laboratories	LAPP
Partner laboratories	Cracovie (IFJ PAN)

II. Identification of the collaboration

Title of the collaboration	Phenomenology of the W and Z boson decays and of new massive states at LHC and ILC
Number of the collaboration	10-138
IN2P3 spokesperson	L. DI CIACCIO; T. HRYN OVA
COPIN spokesperson	Z. WAS
Scientific Domain	Hadronic and Particle Physics

Status of the collaboration

Status	The renewal of the collaboration is requested for the period January 1st - December 31st, 2023
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III. Status report for the period January 1st to December 31st, 2022

III.1 IN2P3 scientists in COPIN

Total time approved for 2022	12
Total time used for 2022	0
List of scientists	

III.2 COPIN scientists in France

Total time approved for 2022	14
Total time used for 2022	14
List of scientists	1. Alexander Korchin (days)

III.3 Scientific results of the above-mentioned collaboration

Description	
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During 2022, the members of the present IN2P3/COPIN agreement have focussed their effort on the finalisation of the analysis of the final state characterised by a Z boson associated to a photon (γ) plus two jets with the full LHC-Run2 dataset collected by ATLAS. An important aim of the analysis is to extract differential cross sections of the electroweak component (EW-Z γ jj) of the process. As expected the extraction of this component poses some challenges due to the relative importance of the QCD-Z γ jj background. The EW-Z γ jj differential cross section measurements are now

progressing very well, together with the interpretation of the result in the frame of the Effective Field Theory. The LAPP student, Poddar Gitanjali, in her third year of PhD studies now, has become the contact person of the EW-Zyjj analysis in ATLAS and her supervisor Narei Lorenzo Martinez, the contact editor.

In parallel the members of the present IN2P3/COPIN agreement have worked on Monte Carlo simulations of detector response and theoretical predictions, which are the necessary ingredients for performing the measurements and interpreting the results. In particular, observables and simulations related to the measurements of diboson (ZZ) pair production at LHC/FCC energies, to the simulation of QED final state radiation, and to the measurement of anomalous electric and magnetic dipole moments have been developed. All these experimental and theoretical studies aim to pin down possible effects of new physics by comparing data with precise SM predictions.

In the frame of this IN2P3/COPIN agreement Alexander Korchin from Cracow (IFJ PAN) is invited to spent two weeks at LAPP where he will give a seminar.

IV. Renewal of the collaboration for 2023

IV.1 Proposed scientific program

Description

The plan for 2023 is to bring the EW-Zyjj analysis including its interpretations to completion and publish the results in a journal. The student Poddar Gitanjali is expected to complete her PhD work and graduate in 2023. On the theory side the developed of more precise calculations for the ZZ pair production at LHC/FCC energies, final state bremsstrahlung and for tau final states are expected.

IV.2 Estimated duration for IN2P3 scientists in COPIN

Total time requested for 2023	12
List of scientists	1. Narei Lorenzo Martinez (4 days) 2. Poddar Gitanjali (5 days) 3. Lucia Di Ciaccio (3 days)

IV.3 Estimated duration for COPIN scientists in France

Total time requested for 2023	14
List of scientists	1. Zbigniew Was (days)

Comment Validation	
Unity Director	Giovanni LAMANNA (LAPP) - 2022-10-24 10:47:33