Experimental and Theoretical Support for FCC from Katowice

Preparation Meeting for the FCC International Collaboration Board

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Experiment
Nuclear Physics Department

- **Heavy Ion Group** supervised by S. Kowalski,
- Group active mainly in NA61/SHINE
- **Number of members 9** (2 faculty, 1 technician, 4 graduate (PhD), 3 undergraduate)
- **At the moment 4 persons for FCC:**

  Seweryn Kowalski

  Katarzyna Schmidt

  Szymon Puławski (PhD)

  Emil Kaptur (PhD)

- **Neutrino Group** supervised by Jan Kisiel
- Active in T2K and ICARUS
- At the moment not at FCC

Theory
Particle Physics Department

- **Number of members 14** (6 faculty, 1 postdoc, 4 graduate (PhD), 3 undergraduate)
- **At the moment 5 persons for FCC:**

  J.G.

  Henryk Czyż

  Karol Kołodziej

  Tomasz Jeliński (postdoc)

  Magdalena Kordiaczyńska (PhD)

Experiment: Work Units

1. Heavy Ion Collisions (2.1.4.1)

Preparation of the experiment with heavy ion,

Model calculations for particle production during heavy ion collisions

Analysis of the observables sensitive for quark gluon plasma (QGP) and search for critical point

2. Off-line software (2.4.11)

Preparation of the offline software for data analysis algorithms,

Simulations of the detector effects and physics processes with GEANT 4 or FLUKA

Preparation of the software framework for data reconstructions and simulations

3. Tracking (2.2.2.10)

Preparation of the tracking algorithms, optimizations and tests (i.e. Kalman filter, neural networks, etc.)

Theory: Work Units

1. Radiative corrections to radiative Bhabha reaction (2.1.3)

Henryk Czyż: **LEP Working groups on precision calculations for the Z resonance (CERN Yellow Report CERN 95-03) and Event Generators for Bhabha Scattering (CERN Yellow Report CERN 96-01)**

BHAGEN95 (M. Caffo, H. Czyż, E. Remiddi) **– update to FCC**

- Implementation of the complete 1-loop corrections into event generator BHAGEN-1PH, tests of the numerical stability, improvements on the efficiency of the generator

2. Exploration of EW Symmetry Breaking (2.1.1) – Karol Kołodziej

Monte Carlo simulations of the processes of associated production of the top-quark pair and Higgs boson including decays

NLO corrections to the top-quark pair – Higgs boson production signal.

Theory: Work Units

3. Exploration of BSM phenomena (2.1.2)

Estimation of effects connected with a production and decay of doubly, singly charged and neutral Higgs bosons within left-right GUT models

4. Theoretical implications of discovery/non-discovery of BSM scenarios (2.1.2.2)

Nonstandard SUSY inspired GUT models: heavy Higgs particles, gauge bosons, light sleptons and squarks, benchmarks etc.

All the above plans for 2 years.

Thank you for attention and the invitation to join FCC!