HIGGSTOOLS: node of IFJ PAN

Institutions:
- IFJ PAN Cracow
- Jagellonian University Cracow
- University of Warsaw
- University of Silesia Katowice

Scientists involved in work of the node -- their expertise:
- Important for ESR 19 Cracow
- Important for ESR 18 Warsaw
- Other

Collaborations:
- With other nodes
- Links with activities outside the network

IFJ PAN and collaborating institutions

IFJ PAN and Jagellonian University:

- **Z. Was** (candidate for supervisor of PhD: ESR19)
- O. Shekhovtsova *()
- A. van Hameren *()
- E. Richter-Was *()
- S. Jadach
- M. Skrzypek

University of Warsaw and NCBJ Warsaw:

- **J. Kalinowski** (candidate for supervisor of PhD: ESR18)
- M. Krawczyk
- S. Pokorski
- J. Rosiek
- A. Kalinowski
- M. Bluj *()
- M. Szleper

University of Silesia:

K. Kolodziej

*() marks possible co-supervisors of PhD theses. The actual choice will depend on the ESR personal interests.

Expertise ESR19

Zbigniew Was : co-author of TAUOLA, PHOTOS, KKMC, TauSpinner progams widely used by High Energy Physics community:

- Active in phenomenology and in constructing Monte Carlo programs for simulations of τ lepton production and decay since more than 20 years now.
- expertise in simulation of radiative corrections in Z,W,H decays at LHC.

Olga Shekhovtsova currently involved in:

- Resonance Chiral Lagrangian calculations for hadronic τ decays.
- Similar calculations for low energy electron-positron annihilations.
- Construction of Monte Carlo generators for the above processes.

Andreas van Hameren currently involved in:

- Development of HELAC-NLO Monte Carlo program.
- Off-shell hard scattering matrix elements for high energy scattering processes at LHC.
- Development and maintenance of One Loop package for one loop scalar functions

Expertise ESR18

Jan Kalinowski: co-author of HDECAY code widely used in Higgs phenomenology over a long period of time involved in:

- investigations of the Higgs sector of the SM and its supersymmetric extensions
- CP sensitive observables, in particular in the chargino/neutralino sectors
- SPA project – the strategy for reconstruction of Lagrangian parameters

recently involved in

- analyses of the WW scattering processes at the LHC
- electroweak corrections in the R-symmetric supersymmetric model

Elzbieta Richter-Was, co-author of AcerMC Monte Carlo and AcerDET fast simulation program used for phenomenological studies at LHC.

- Active physicists of ATLAS Collaboration in the area of SM physics measurements and detector performance studies.
- Former convenor of "Higgs Working Group" and "Tau Working Group" of ATLAS Collaboration

Expertise

Stanislaw Jadach, co-author of TAUOLA, KKMC, currently involved:
- QCD NLO parton shower Monte Carlo
- Calculations for FCee (TLEP) Standard Model processes.

Maciej Skrzypek, co author of KORALW YFSWW, currently involved:
- QCD NLO parton shower Monte Carlo

Tomasz Przedzinski: currently involved:
- C++ programing and software organization of all our projects.
- coordination of work from the perspective of software and on installation of software in LHC experiments.

Michał Bluj, an active member of the CMS collaboration over 10 last years;
- expertise in tau-based triggering and tau reconstruction
- involved in the H→ττ search with CMS data collected during LHC Run-I.
- Coordination of preparation of tau-based triggers of the CMS for LHC Run-II,
- Study of viability of the measurement of the Higgs boson spin-parity properties with the H→ττ channel.

Expertise

S. Pokorski

- Leading expert in model building: unification, SUSY, alternative EWSB models
- phenomenological investigations in the domain of Higgs interactions and its signatures in the context of MSSM, NMSSM and other approaches
- works on evaluation of consequences of recent Higgs properties measurements on theoretical foundations for Higgs sector
- flavour problem within SM and extensions
- dark matter, CMB and cosmology

A. Kalinowski involved in τ lepton physics with the CMS detector since 2006, in particular:

- Preparation of strategy of the MSSM H→ττ search
- Background estimation methods for H→ττ and analysis of data collected by the CMS detector during LHC Run-I
- Currently: a study on viability of the Higgs boson CP estimation via tau polarisation

K. Rolbiecki (U Warsaw and UA Madrid) :

- works on signatures and implications of possible supersymetric particles on Higgs observables and WW scattering processes,
- works on phenomenology of the possible future Linear Colliders measurements.

Expertise

M. Krawczyk works on:

- different options/extensions of Higgs sector of elementary interactions
- efforts on defining signatures and observables at present and future accelerators
- dark matter and and the evolution of the universe

J. Rosiek, co author of SUSY_FLAVOR, a tool for FCNC and CP-violating processes

- mechanism of lepton flavour violation in SM with general dimension-six operators
- consequences of supersymmetric models on favour and chiral structure

M. Szleper: member of the CMS collaboration:

- collaborates with theorists on studies of signatures, such as for WL WL scattering at LHC.
- studies for the e+e- ILC - search for the NMSSM Higgs bosons in the $\gamma\gamma$ collider option
- responsible for the calibration of the CMS HCAL before the first LHC collisions,
- studies of the LHC potential for WW scattering.

K. Kolodziej currently involved:

- Calculation of tree level amplitudes for Standard Model and Beyond Standard Model processes.
- Author of the CARLOMAT program for computation of lowest order cross-sections

Links with other nodes

LAPP Annecy

Phenomenology of observables for Higgs signatures for spin and CP properties. Case of Higgs decays to τ leptons.

DEMOKRITOS:

Calculation and implementation of matrix elements for studies of systematic errors and for use in TauSpinner in more exclusive applications

NIKHEF:

- Calculation and implementation of matrix elements for studies of systematic errors and for use in TauSpinner in more exclusive applications
- also two postdocs and one PhD student.

Univ Freiburg:

- Evaluation of performance for observables used in phenomenology of measurements for Higgs and New Physics with final states featuring tau leptons.

Links to other activities

Partners for work on low energy tau-lepton data and models phenomenology

- University of Victoria (BaBar)
- Aachen University (BaBar and CMS)
- Budker Institute Novosibirsk
- Nagoya University (Belle)
- Mexico University
- Barcelona
- Kharkov University
- Hangzhou University
- TU Dresden

Partners interested mostly in LHC mainstream Higgstools activities

Bonn University