



# Physics and Detector Simulations (PDS) Group

## Activities and People

Krzysztof Genser, Soon Yung Jun, Guilherme Lima, Steve Mrenna, Adam Para,  
Alexei Strelchenko, Hans-Joachim Wenzel, Julia Yarba,  
(P. Canal), (R. Hatcher)

Presented by Krzysztof Genser

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# Physics and Detector Simulation Group Activities

- PYTHIA8 development and support of experiments  
S. Mrenna
- GeantV prototype R&D  
Ph. Canal, (S. Banerjee), K.L. Genser, S.Y. Jun, J.G. Lima,  
(K. Pedro)
  - Finishing this year after achieving  $\sim 1.4$  -  $\sim 2$  speedup with respect to Geant4 and speeding up Geant4 by about 10%
- GeantX (HPC/GPUs): ECP and HEP collaboration  
Ph. Canal leader + subset of GeantV team
  - R&D to run on the next generation of supercomputers with efficient use of GPUs

# Physics and Detector Simulation Group Activities

- Geant4

- CPU & Memory profiling and benchmarking, Hadronic validation and monitoring of official and internal releases, VecGeom (new geometric solid package) development & support of experiments

(S. Banerjee), (V.D. Elvira), K.L. Genser, S.Y. Jun, J.G. Lima, H-J. Wenzel, J. Yarba - as members of Geant4 Collaboration

- Integration/development of Opticks (Geant4 extension)

- Optical photons package (by S. Blyth) using NVIDIA® OptiX(GPU)
- Development of needed features and integration with art/LArSoft

H-J. Wenzel, S.Y. Jun, et al.

- Direct contributions to experiment simulation code

- Mu2e

K.L. Genser

# Physics and Detector Simulation Group Activities

- LArSoft Geant4 (LArG4) interface maintenance and development  
H-J. Wenzel
- Geant4 Variable Model Parameters (VMP)
  - Effort to enable Geant4 systematic error estimation and parameter optimization  
(L. Fields), K.L. Genser, S.Y. Jun, (R. Hatcher), (G. Perdue), J. Yarba
- Detector R&D, development of test infrastructure & studies of detector effects and related contributions to DUNE and @NEXT as well as support of Lab's detector needs (A. Para)
- Advanced user support and administration of FNAL HPC(LQCD) facilities (A. Strelchenko)

# Selected other Activities of PDS Group Members

- In addition
  - Ph. Canal participates in the root development
  - S. Mrenna co-convenes the Matrix Elements and Future Generators subgroup of the CMS Generator group and participates in SciDAC (Scientific Discovery through Advanced Computing) and QuantISED (Quantum Information Science-Enabled Discovery) funded projects
  - A. Strelchenko participates in US Lattice Quantum Field Theory Exascale Computing (ECP) project
  - H-J. Wenzel (within AS group) works on MARS/SYNERGIA integration