

# Highlights

- **Goal:** write Electromagnetic physics models for modern parallel computing architectures dealing with multiple tracks, accurate, fast and “portable”:
  - maximum *throughput* for given resources
  - exploit both *SIMD* (vector pipeline) and *SIMT* (accelerators) execution models
  - *common source code* between scalar, vector and accelerator (GPU, Xeon Phi)
- **How:** Explore alternative sampling techniques (avoid conditional branch, do-while) effectively vectorizable
  - Alias sampling technique
  - Shuffling method
- **Instruments:** Statistical Validation of vectorized physics models:
  - $\chi^2$  Pearson-test, Kolmogorov-Smirnov test, Anderson-Darling test
  - Normal Probability Plots and Q-Q Plots
- **Results:** Compton scattering Klein-Nishina model ongoing validation results and further developments