# Recent Developments with the New Tools for Collimation Simulations in Xsuite

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Short Abstract

- **Xsuite** is a new collection of particle tracking codes, quickly gaining in popularity
- All collimation tools for Xsuite collected in **Xcoll**
- Updated crystals in **Everest** (internal scattering code)
- Prototypes for coupling to **Geant4** and **FLUKA**
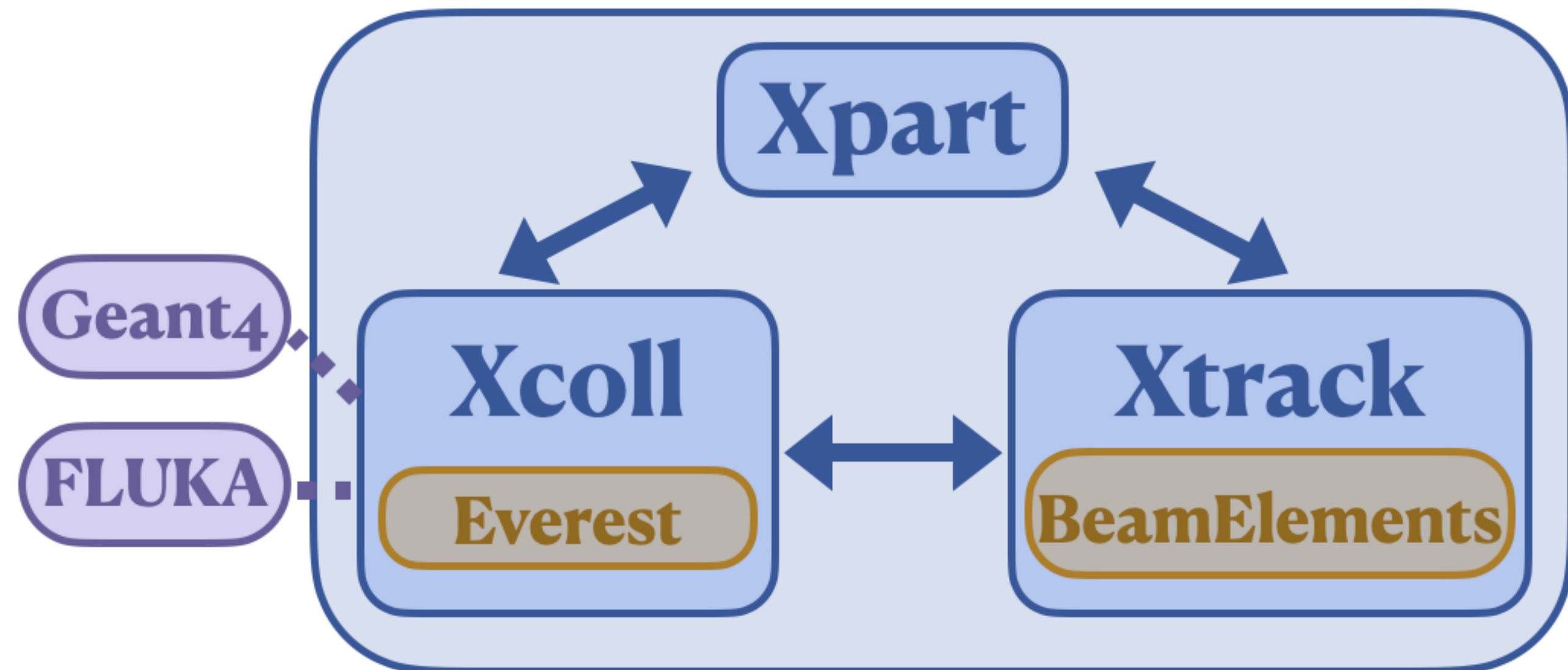
Xsuite and Xcoll

Xsuite: Collection of python packages for particle tracking in accelerators

- **Xobjects**: Underlying API for JIT compilation to different architectures
- **Xtrack**: Main particle tracking code
- **Xpart**: Tools to generate initial particle distributions
- **Xcoll**: New package for collimation simulations:
  - Built-in algorithm for high-energy proton scattering in materials (Everest)
  - Coupling to external scattering codes (Geant4, FLUKA) in development
  - Integration with Xpart to provide collimation-tuned initial distributions
  - Flexible and simple control of movable devices in an Xtrack line
  - Streamlined workflow for different loss map simulations
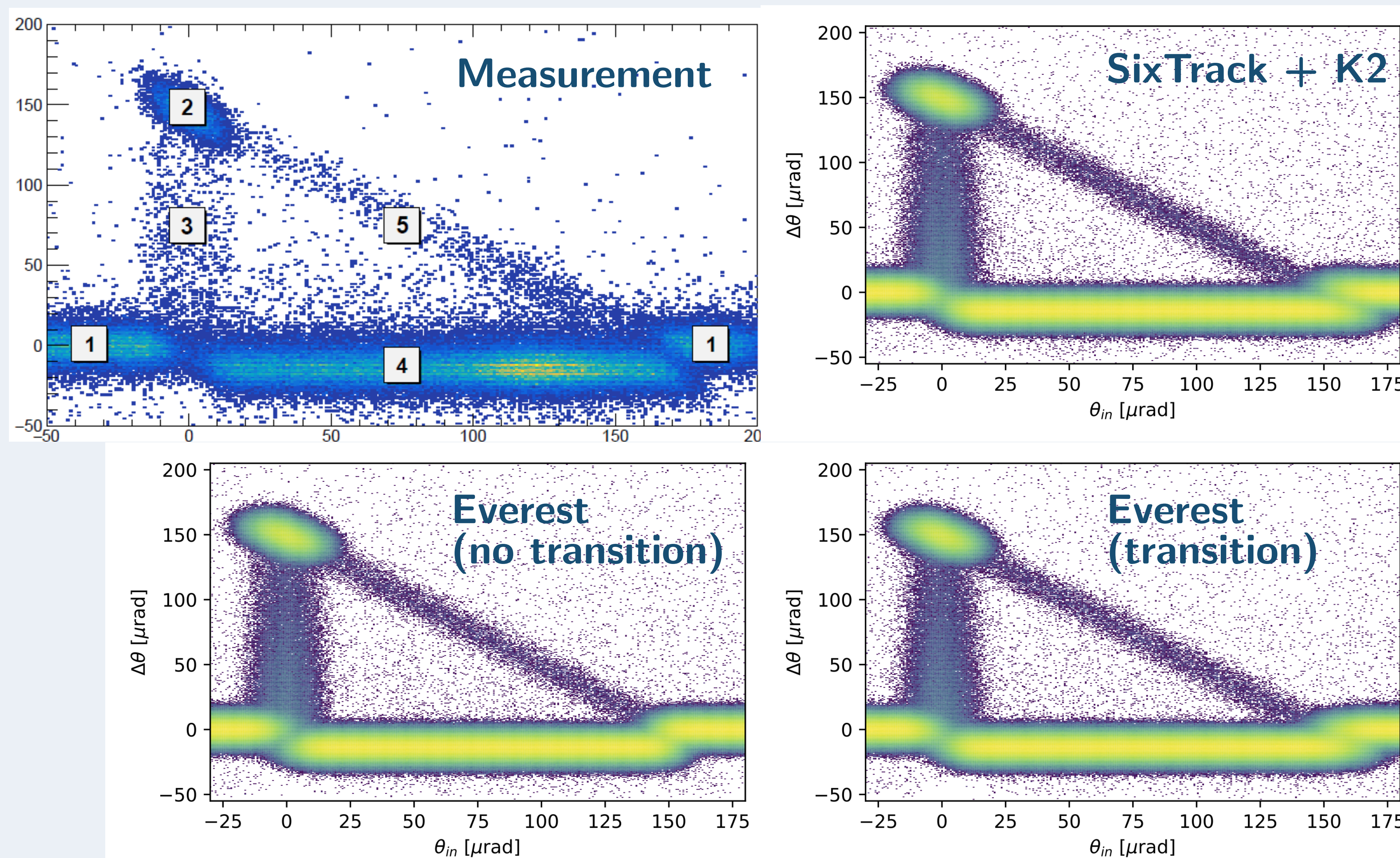
Full Ring Loss Map
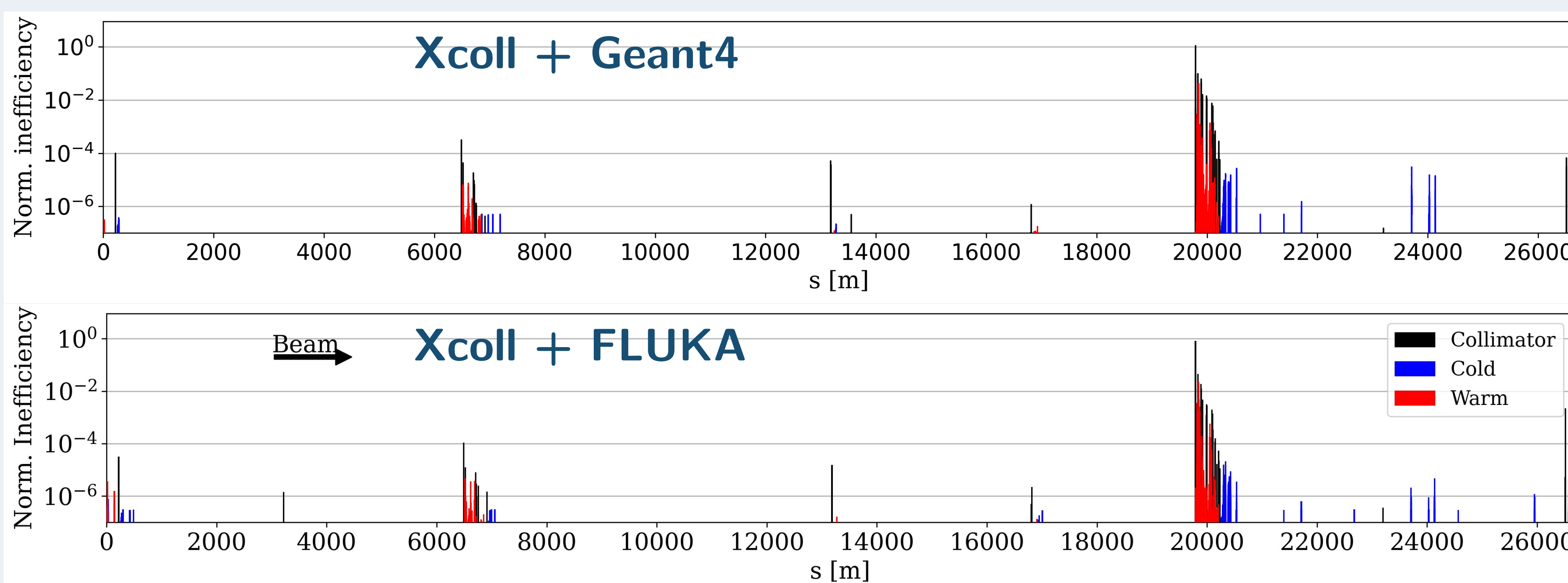
Simulated B1V loss map for the LHC with Run 3 optics at collision ($\beta^* = 30\,\mathrm{cm}$)

Different Scattering Routines
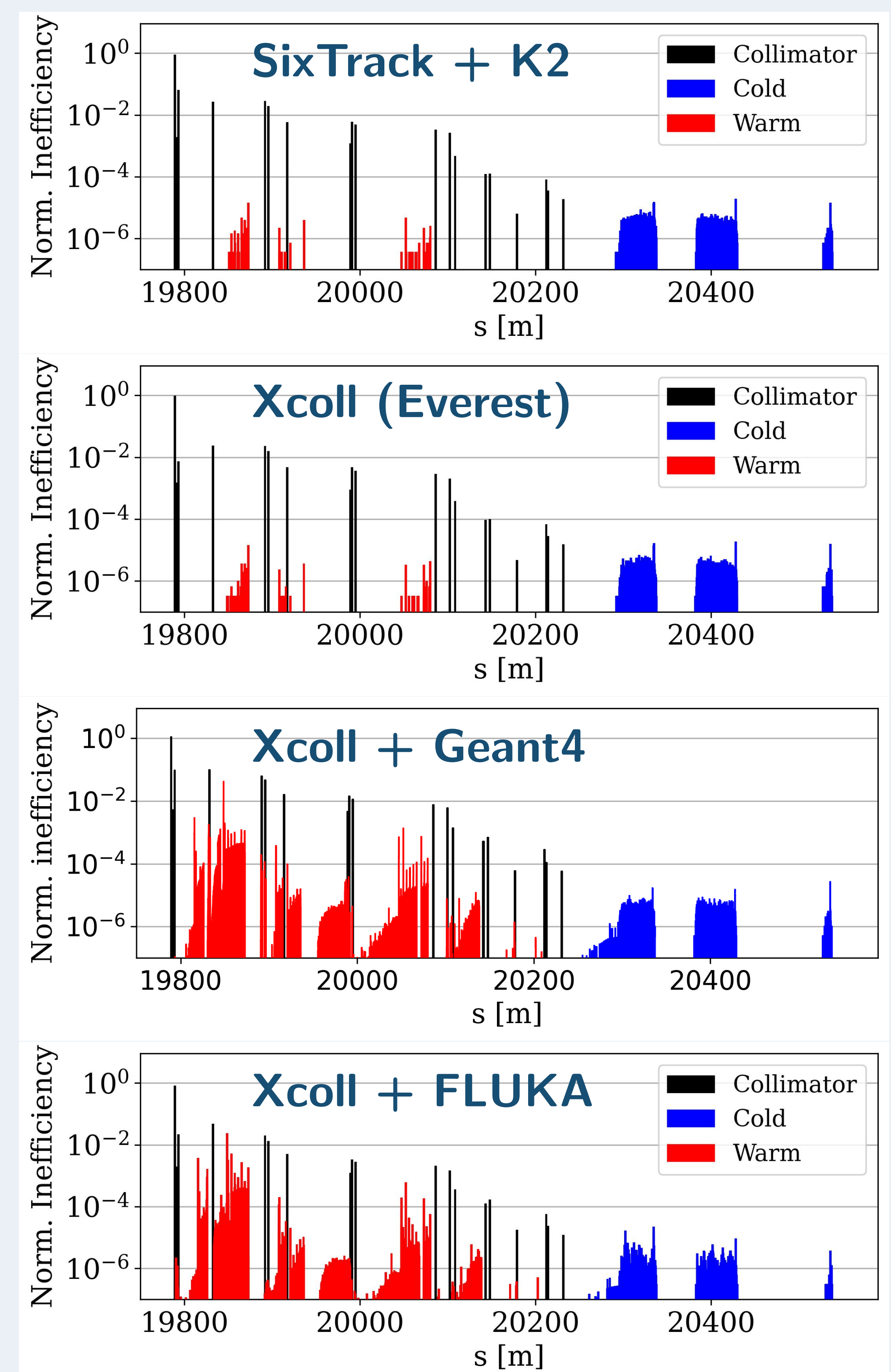
Everest and its Crystals

Comparison of simulated particle deflection in a crystal to measurement data:
- deflected angle in function of the initial angle
- all simulations include angular smear (2.8μrad) for detector resolution
- implementation with and without transition regions

Conclusions

- Different types of collimation studies can be performed with Xsuite using Xcoll
- Everest updated; emphasis on crystal routines
- Good progress on Geant4 and FLUKA couplings

Paper $\Rightarrow$