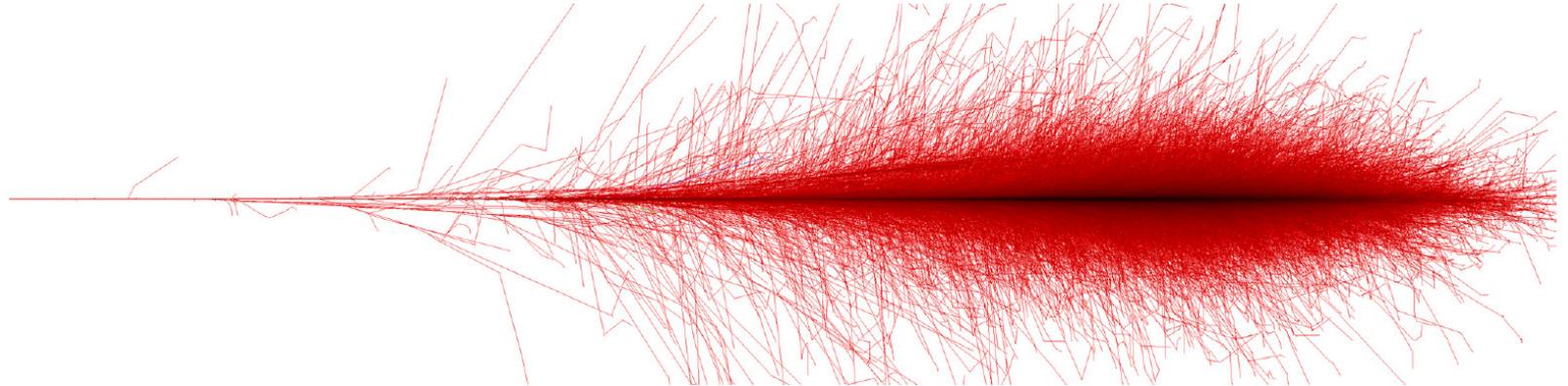


Project overview and workshop goals

Tim Huege (KIT & VUB)



Welcome – very happy to see you here!



CORSIKA 8

Air-Shower Simulation and Development Workshop

A workshop to discuss the technology and science of air-shower simulations with CORSIKA 8, and meeting of CORSIKA 8 developers and developers-to-be.

Organization
Konrad Borner
Ruth Caspito
Jim Hillier
Tim Huege
Tangyu Pingz
Felix Sjöberg
Michael Schmelling

Max Planck Institute
for Nuclear Physics
Heidelberg

12-15 July 2022

Contact: corsika-08@mpi-hd.mpg.de
Web: <https://indico.ecp.kit.edu/event/2711>

- ~35 on-site participants, many more on Zoom
- very glad to be hosted by MPIK
- mixture of collecting ideas, discussing state of project and planning ahead
- workshop, we want to *discuss*
- free coffee breaks & lunches (by MPIK) and conference dinner (by KIT)

CORSIKA

- *the* work horse for air shower simulations for more than 20 years
- dedicated maintenance by KIT (D. Heck, T. Pierog, ...)
- gave the community a common reference to build on

CORSIKA: A Monte Carlo code to simulate extensive air showers

D. Heck (Karlsruhe, Forschungszentrum), J. Knapp (Karlsruhe U., EKP), J.N. Capdevielle (College de France), G. Schatz (Karlsruhe, Forschungszentrum), T. Thouw (Karlsruhe, Forschungszentrum)

Feb, 1998

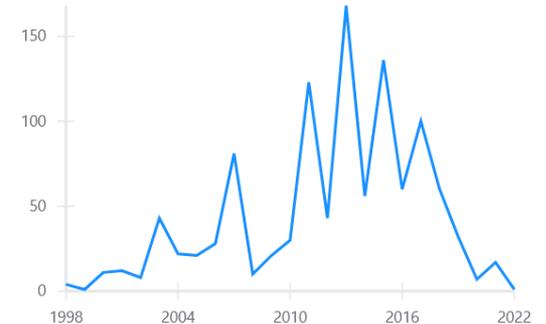
90 pages

Report number: FZKA-6019

 pdf  links  cite

 1,095 citations

Citations per year

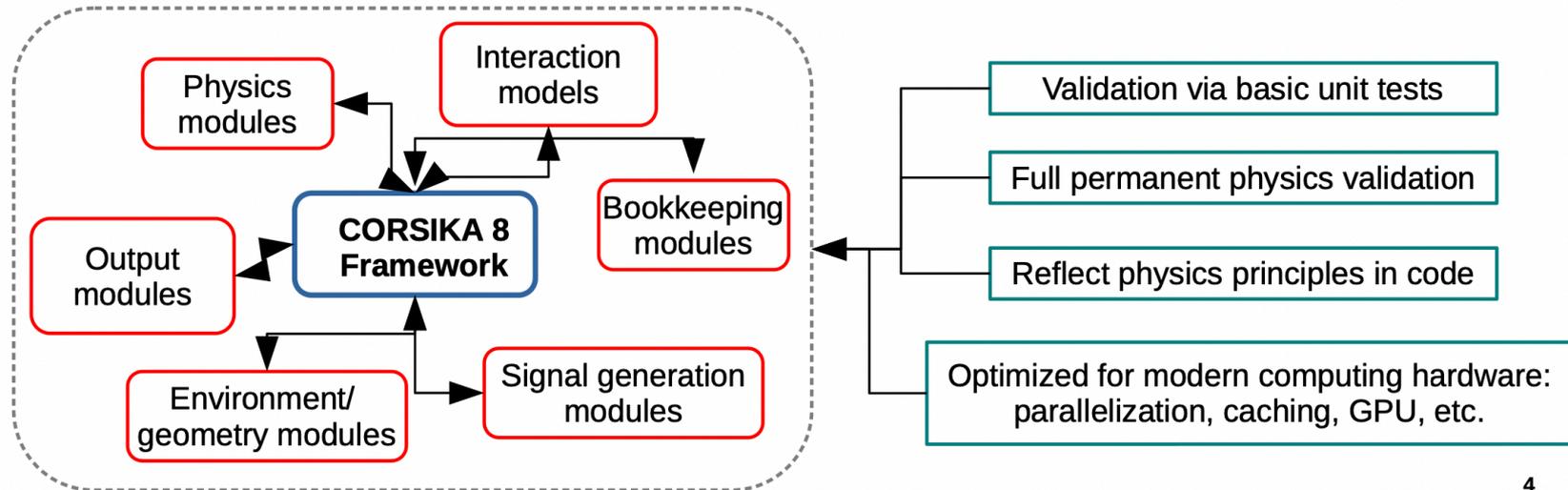


Limitations of CORSIKA 7

- monolithic FORTRAN code (several dialects mixed), hard to navigate by physicists today
- program „options“ heavily intertwined in the source code
- hand-optimized: fast, but incurs limitations, for example: atmospheric model based on strictly exponential density profiles
- difficult to adapt to modern super-computing environments: MPI-parallelized, but no multi-threading, no GPU parallelization, ...

Philosophy of CORSIKA 8

- a modern re-implementation in C++, with focus on modularity
- designed with the needs of highly parallel (super-)computing in mind
- coordinated by KIT, but with strong community integration



State of the project

- hadronic and electromagnetic cascades available
- extensive validation done with CORSIKA 7 and other codes
- output formats defined, based on YAML and Parquet; Python library
- steering so far through command-line options
 - caveat: framework flexibility versus reproducibility
- for experts: now is a great moment to engage in the development!
- end users please have a little more patience, still working on ...
 - simulation steering
 - documentation
 - performance optimization
 - some important physics: LPM effect, FLUKA, ...

Project organization

- C8 started in 2018, up to end of 2021 project led by Ralf Ulrich
- since beginning of 2022 we have a „steering committee“
 - Tim Huege project coordination
 - Dominik Baack (Alexander Sandrock) electromagnetic interactions
 - Tanguy Pierog (Felix Riehn) hadronic interactions
 - Remy Prechelt (Max Reininghaus) software development
 - Augusto Alves jr. performance, parallelization
 - Lukas Nellen deployment, cont. integration
 - Ralf Ulrich honorary member

Project organization

- developer meeting via Zoom every 2nd Thursday at 17:00 CEST
 - slides and minutes [on the Indico](#)
 - optionally: meetings with particular focus in between
- (short) radio-focused meeting weekly, Fridays at 9:30 CEST
- steering committee meeting every 4th Tuesday at 17:00 CEST
- please also check [the C8 calendar](#)
- we use a C8-developer mailing list, contact Tim if you want access
- we have a C8 Slack channel, contact Tim if you want access

Workshop program

- Tuesday: Electromagnetic Interactions, Radio-Emission Simulation
 - Wednesday: Software Development, Cherenkov-Light Simulation
 - Thursday: C8 Tutorial, Hadronic Interactions
 - Friday: New Simulation Approaches, Project Matters, Roadmap
-
- Goal is to update everyone to current state, discuss open issues, plan and coordinate further work

Organisational things

- Who will participate in the tutorial on Thursday morning?
- We will take a workshop photo on Thursday after lunch!
- ...?

Summary

- I am looking forward to a lively and fruitful workshop
- Let's take C8 significant steps towards a first release