

ColliderBit Working Group Update

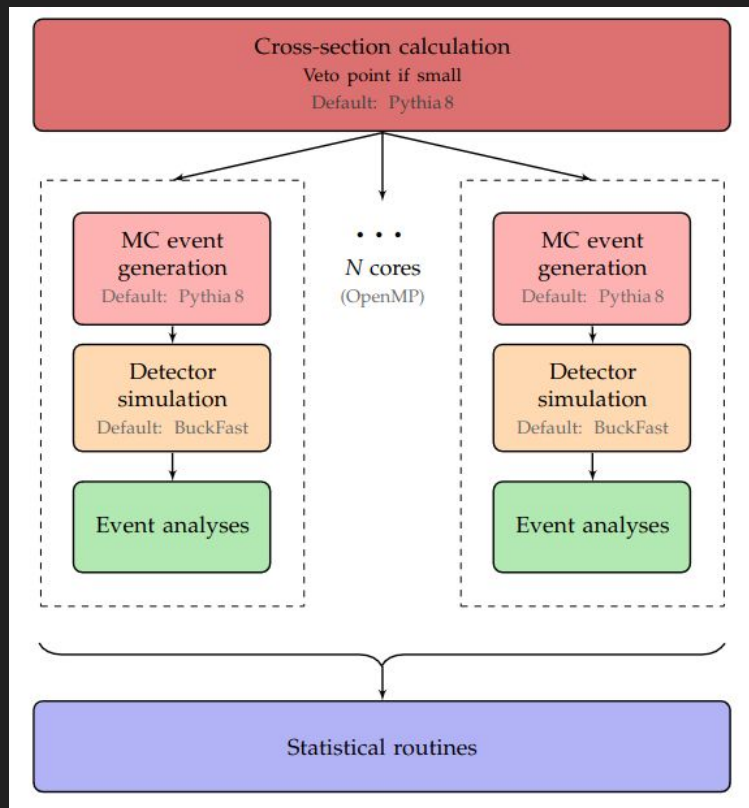
WG Convenors: Are, Chris
GAMBIT XV
Cambridge 2023

What does ColliderBit do?

Calculates collider observables and likelihoods for LHC and LEP searches / measurements.

Also some Higgs sector observables.

Can generate Monte Carlo events at runtime with Pythia, or interpolate cross-sections & acceptances from grids of pre-simulated points.



Members (according to the email list)

- Adil Jueid
- Alex Woodcock
- Anders Kvellestad
- Andy Buckley
- Ankit Beniwal
- Are Raklev (convenor)
- Andre Scaffidi
- Ben Farmer
- Chris Chang (convenor)
- Christopher Rogan
- Csaba Balazs
- Holly Pacey
- Jeriek Abeele
- Jonathan Cornell
- Felix Kahlhoefer
- Lasse Braseth
- Nazilla Mahmoudi
- Martin White
- Matthias Danninger
- Marcin Chrzaszcz
- Nicola Serra
- Pat Scott
- Peter Athron
- Philip Grace
- Sanjay Bloor
- Tomas Gonzalo
- Tomasz Procter
- Patrick Tunney
- Victor Ananiev
- Yang Zhang
- Pengxuan zhu

Work in progress from GAMBIT XIV

- ColliderBit Solo (CBS)
- Make Interpolated yields system more general (less model-specific)
- H/A -> tau tau likelihoods from HiggsBounds 5: stability issues and code merging
- Event class extension for long-lived particle searches
- Pacer project: Speeding up event generation
- Simplify LEP cross-section capability structure
- Switch to subcapability system for analyses
- Xsec backend: cmake system and some testing
- Finalise Prospino backend (stability)
- Implement alternative to capped likelihood
- SModelS backend
- Salami
- Backend MadGraph
- Complete the Pythia 8.3 move
- Fix how we get the initial cross-section maximum estimates from Pythia
- Beam dump constraints (MadDump as backend)
- Generalize and streamline efficiencies used in BuckFast
- Make cutflows thread-safe and automate testing
- Multiple jet collections

Some things achieved since the last meeting

- Merged ColliderBit_development branch into master
- Added a cmake flag to turn cutflows on/off (currently propagating this to all analyses).
- Upgrades to contour and rivet
- Further work on CBS paper
- MadGraph backend connected to ColliderBit (still requires some testing)
- Progress in Pacer project for speeding up fastjet step

Work in progress

- ColliderBit Solo (CBS)
- Make Interpolated yields system more general (less model-specific)
- H/A -> tau tau likelihoods from HiggsBounds 5: stability issues and code merging
- Event class extension for long-lived particle searches
- Pacer project: Speeding up event generation
- Simplify LEP cross-section capability structure
- Switch to subcapability system for analyses
- Xsec backend: cmake system and some testing
- Finalise Prospino backend (stability)
- Implement alternative to capped likelihood
- SModelS backend
- Salami
- Backend MadGraph for event generation
- Complete the Pythia 8.3 move
- Fix how we get the initial cross-section maximum estimates from Pythia
- Beam dump constraints (MadDump as backend)
- Generalize and streamline efficiencies used in BuckFast
- Unify the way we use cutflows inside of Analyses
- Multiple jet collections

Added since last F2F:

- LHC Analyses that rely on neural nets
- Analysis Backend collector
- Baseline selection Analyses
- Swap to using Pythia's parallelism