

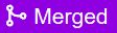






# RooFit-AD Plan of Work

# Progress so far...

- Built a proof of concept on how AD can be used to differentiate roofit models.
  - Got good results and some interesting feedback on our work (with a good sprinkling of doubt)!
- Went on to add a prototype of this to ROOT  #11773
  - Idea was to add the basic code squashing functionality to ROOT
  - Got some serious feedback on possible issues.
  - The biggest problem - we still touch ROOT classes => maintenance becomes difficult! (credit: Jonas R.)
  - Solve this by performing a function lookup instead => A standalone lib with our 'translate' functions.

# What's Next?

- Split current work into steps (each implemented as an individual PR)
  - Simplify the already existing PR (#11773) and cherry pick the class that wraps the RooFit model. Implement is as a separate RooFit class and come up with tests.  Merged #12050
  - Create an interface for analytic gradients with clad in the previous class.  Merged #12219
  - Add an interface for hessian support from clad.  Blocked
  - How to get the code squashing to work - current vs lookup. Majorly involves design discussions and trying out the approach suggested by Jonas. [JonasR]  Done
  - Interface with the minimizer. Involves hooking up the gradients back into MINUIT so that our class can used AD based derivatives end-to-end.  Merged #12381 **Minimum work for it to be advertised**
  - Investigative Profile likelihood calculations using AD. **Minimum CHEP Deliverables**
  - Formally benchmark the efforts in ROOT.  Open #267
  - Extending support for code gen...

# What's Else?

- Some literary work!
  - ACAT proceedings paper. Basic structure in, now have to flesh it out. ● Done
  - Prepare presentation for talk at CHEP'23. [ May ]
  - Prepare presentation for accepted paper at IPDPS'23. [ May ]

**End!**

Thanks!