

Initial optimization for Γ_c with Stellopt

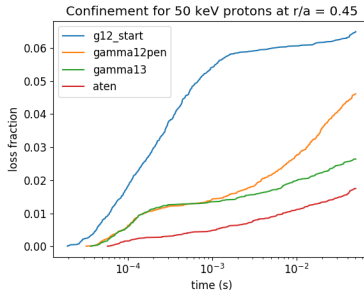
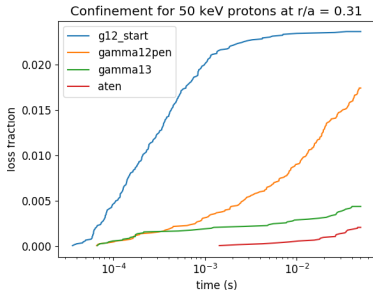
A. Bader

Wistell Meeting, Jun 14, 2019

New Γ_c metric implemented in STELLOPT

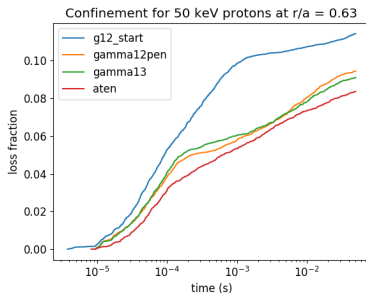
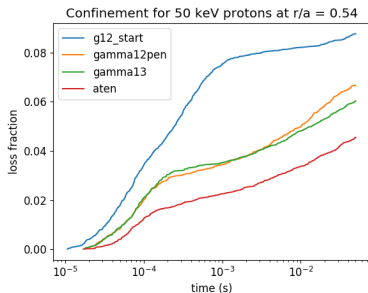
- First semi-successful optimization attempts completed
- Optimizations improve confinement, but do not reach ATEN levels
- Will present 2 optimization attempts and comparison to ATEN for 50 keV protons
- Several issues discovered (to be discussed at end)

Loss for 50 keV protons (part 1)

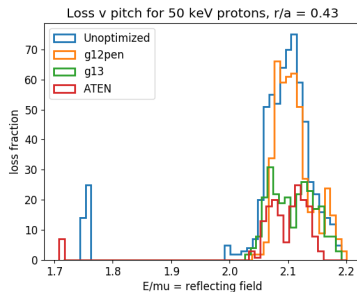
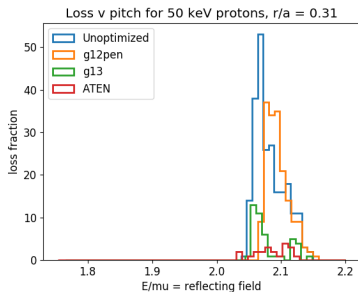


Calculations (and all future ones) using DOEVAL

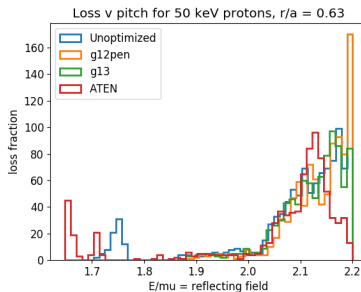
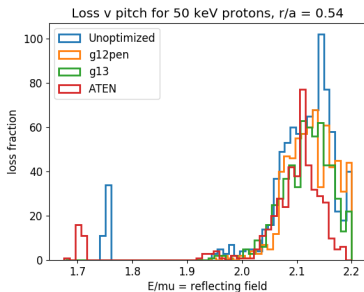
Loss for 50 keV protons (part 2)



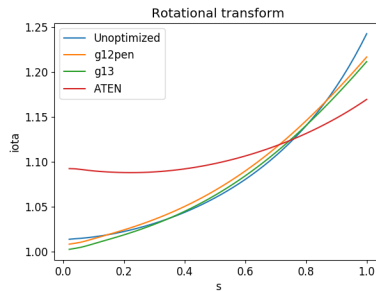
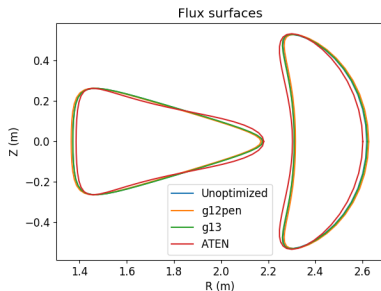
Loss per pitch for 50 keV protons (part 1)



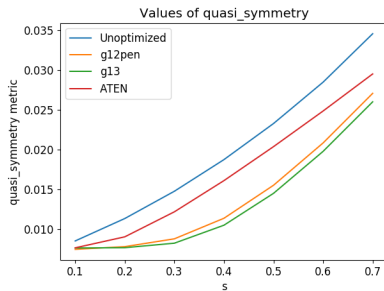
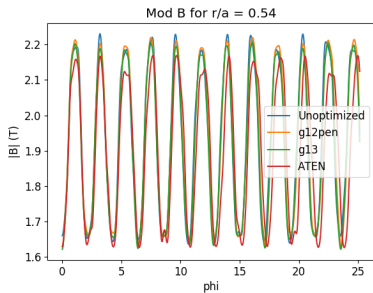
Loss per pitch for 50 keV protons (part 2)



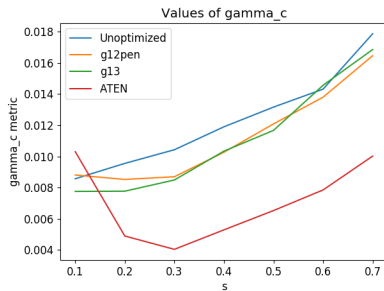
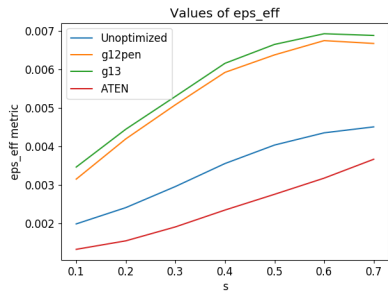
Flux surfaces and iota



$|B|$ on field line and QH metric



ϵ_{eff} and Γ_c



Some issues with the optimization

- There are disagreements between STELLOPT's calculation and ROSE's calculation of Γ_c
 - Relative ordering is ok, but radial dependence is reversed
 - Data presented (for Γ_c and QH was from ROSE
 - QH metric has been adjusted to agree with ROSE's calculation, some “features” of STELLOPT's calculation have been removed
- Issues with LM optimization in STELLOPT
 - Nearly every run has an LM parameter of Infinity, not sure why
 - Sometimes STELLOPT decides to output the wrong (unoptimized) file