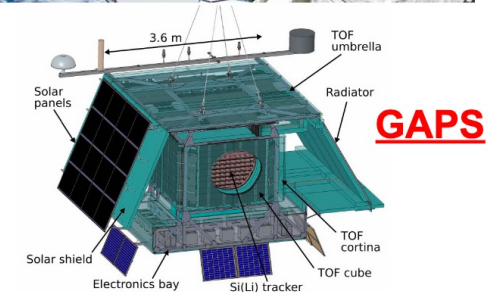
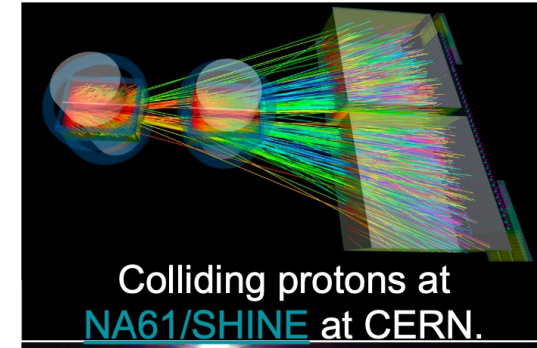


OSG David Swanson Award Lightning Talks

Simulating Antimatter via High Throughput Computing

- **Needle in a haystack:**
 - **100 million** proton-proton collisions at NA61/CERN.
 - Expect 500 deuterons & 50 antideuterons.
- **Bigger haystack, smaller needle:**
 - **100 billion** cosmic-ray particles recorded by AMS-02/ISS.
 - Found ~20 antihelium candidates (1 to 2 events/year).
- **Background vs signal events via HTC:**
 - **100 trillion** proton-proton collisions simulated.
 - 68 million core hours (~**8000 core-years**).
 - Data output: 100 million GB → 1 million GB → 10 GB.
- **Impact:**
 - First cosmic antihelium background with a physics model.
 - 3 publications^{[1][2][3]} (110+ citations), and a PhD thesis^[4].
- **Future:**
 - GAPS/NASA will fly in 2024[#], about 40 km over Antarctica.
 - Cosmic-ray atmospheric backscattering simulations.



Bioinformatics on the Open Science Grid

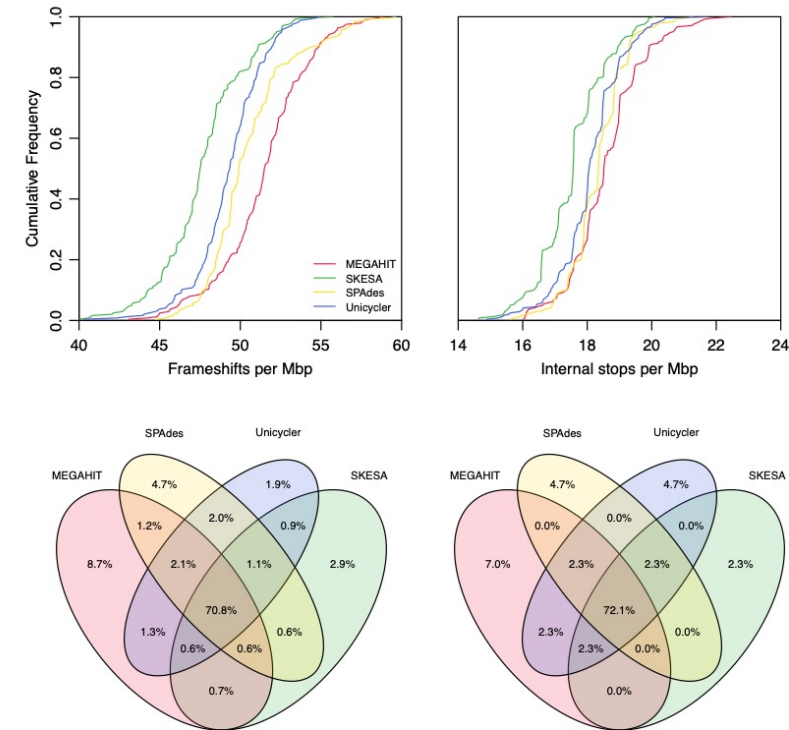
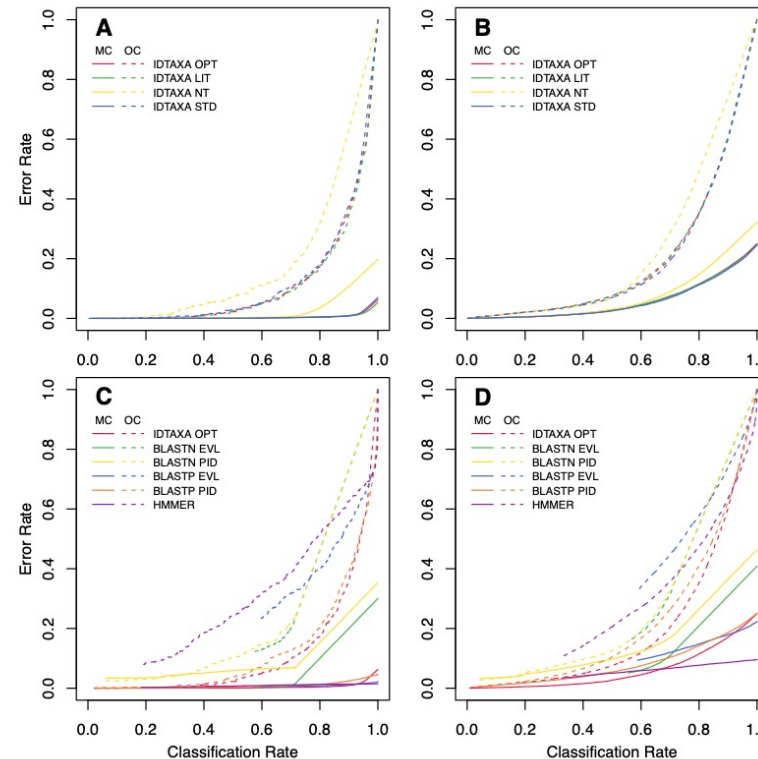
Dr. Nicholas Cooley
Postdoctoral Research Associate
University of Pittsburgh
Department of Biomedical Informatics
Wright Lab



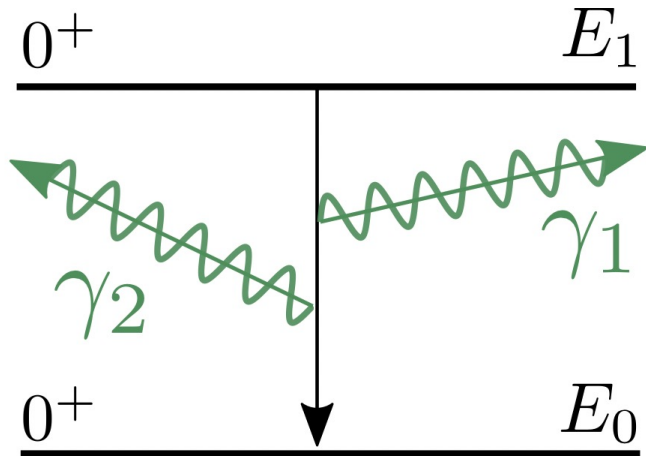
Funding:
NIH-DP2: 1DP2AI145058-01
NLM training grant: T15LM007059

Massively parallel compute gives access to exhaustive benchmarking:

- Cooley, N. P., & Wright, E. S. (2021). Accurate annotation of protein coding sequences with IDTAXA. *NAR Genomics and Bioinformatics*, 3(3). <https://doi.org/10.1093/NAR/GAB/LQAB080>
- Paper on pseudogenes in refseq coming soon!
- Papers on pairwise orthology inference, and very large scale orthology networks coming ... later?

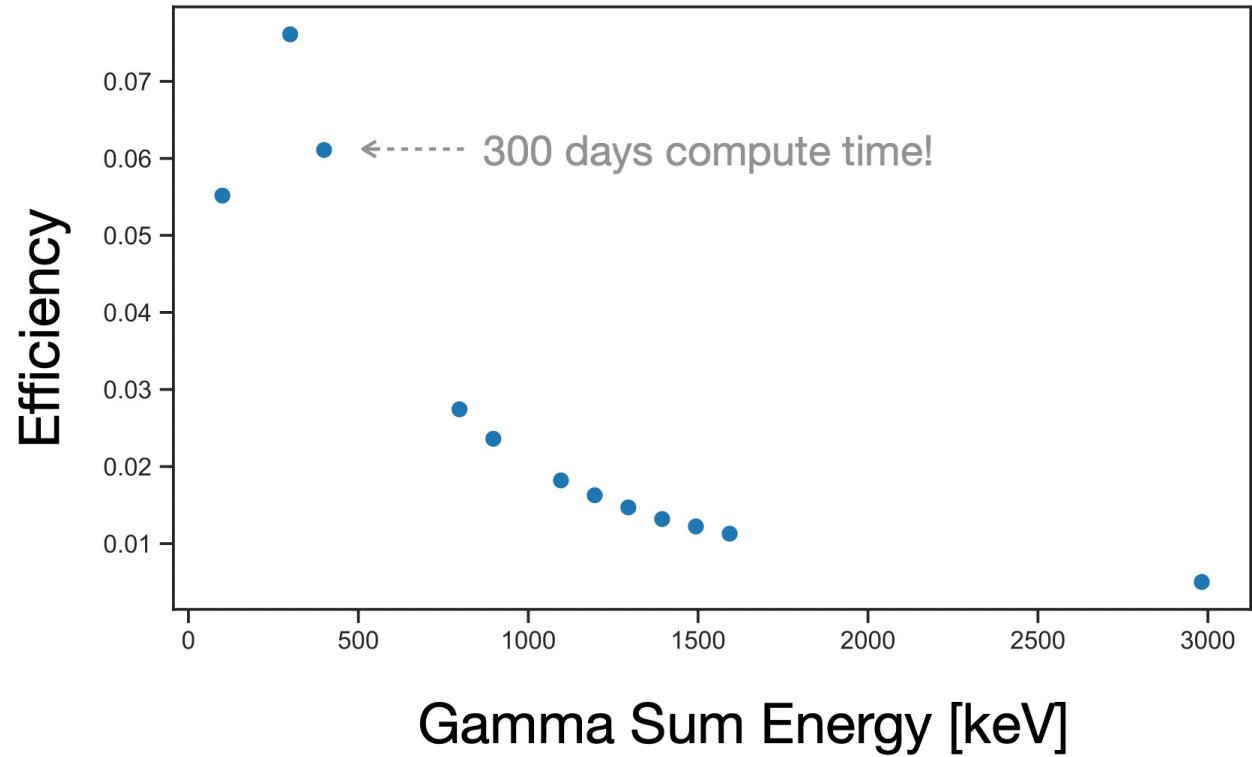
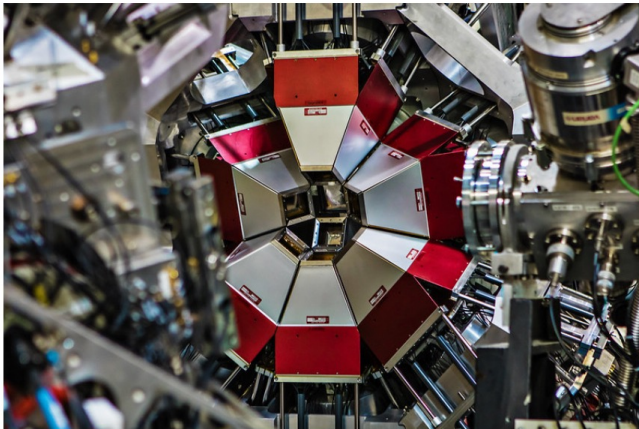


Nicholas Cooley, 2021



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Connor Natzke, 2022