CTP Dark Matter Group & subMIT

Dr. Joshua Foster, Dr. Benjamin Lehmann, Dr. Siddharth Mishra-Sharma, Marianne Moore, Wenzer Qin, Prof. Tracy Slatyer, Yitian Sun

- Current computation situation:
  - Erebus, a dedicated machine for the group with large memories designed for Fermi-LAT data analysis.
  - Clusters associated with other institutes (such as IAIFI).
  - Currently testing out capabilities of subMIT on part of the workflow.
- Typical workflow and computation:
  - Running and developing DarkHistory: an early universe energy injection simulation code. Numerical integrations (low dimension) with IDL, large matrix inversion, large table interpolation (~TB), neural network training and prediction.
  - Fermi-LAT telescope data analysis. Process and analyze large dataset (~TB) using fermitools (such as convolving large data cubes). JAX/XLA, GPU accelerated Bayesian inference.
  - Running large-scale distributed simulations with distributed grid/mesh such as Enzo, Concept, and Gadget etc. Running other simulations such as 21cmFast, etc. Simulation with distributed grid/mesh. Simulation with high spatial resolution (~1024^3), sustained parallel computing with OpenMP/MPI, etc.
  - Analyze other datasets, such as radio telescope datasets. Fast and reliable access to large storage/scratch spaces.
- Main computation need:
  - Large (~TB) storage and large (~10TB) scratch with quick access to large data file. (Current access to /data/ can be a bit slow.) Large memory (~100GB) to load data and run simulations.
  - OpenMP/MPI support on cluster for distributed computing (might need to be installed by cluster management to maximize performance). Homogenized nodes to efficiently parallelize code.

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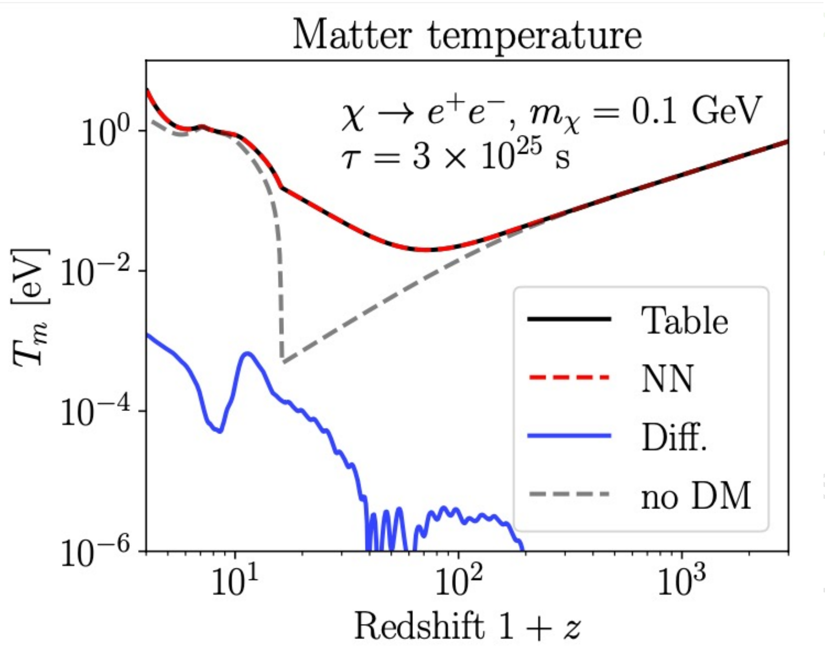

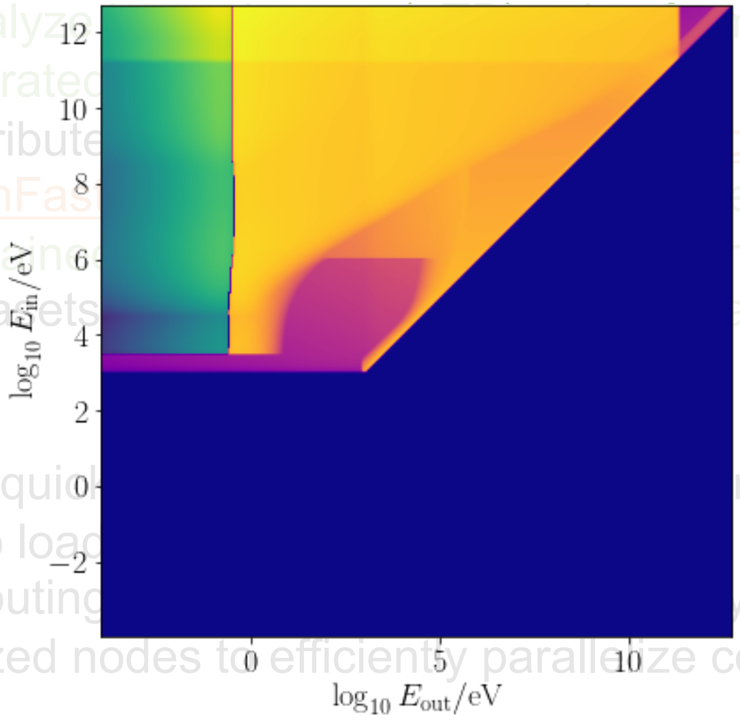

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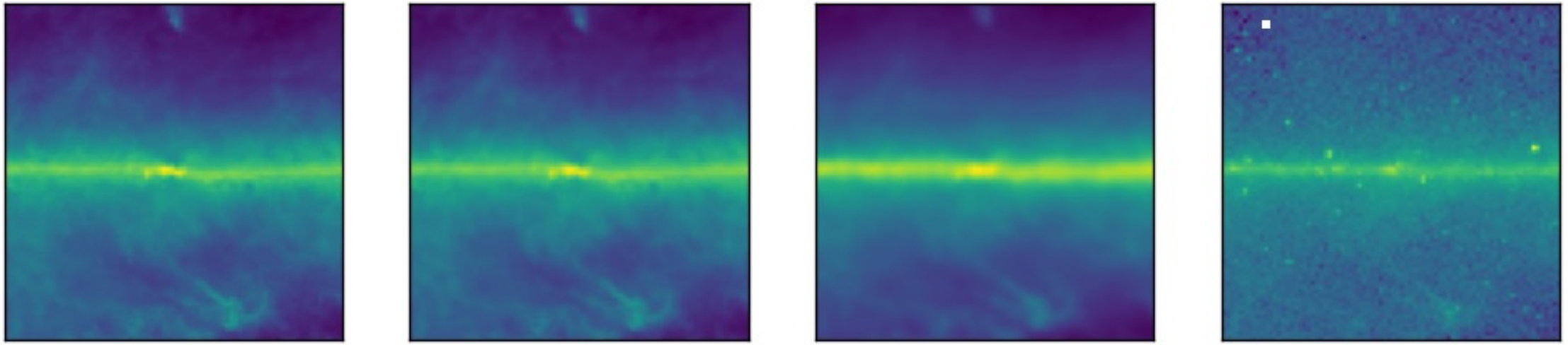

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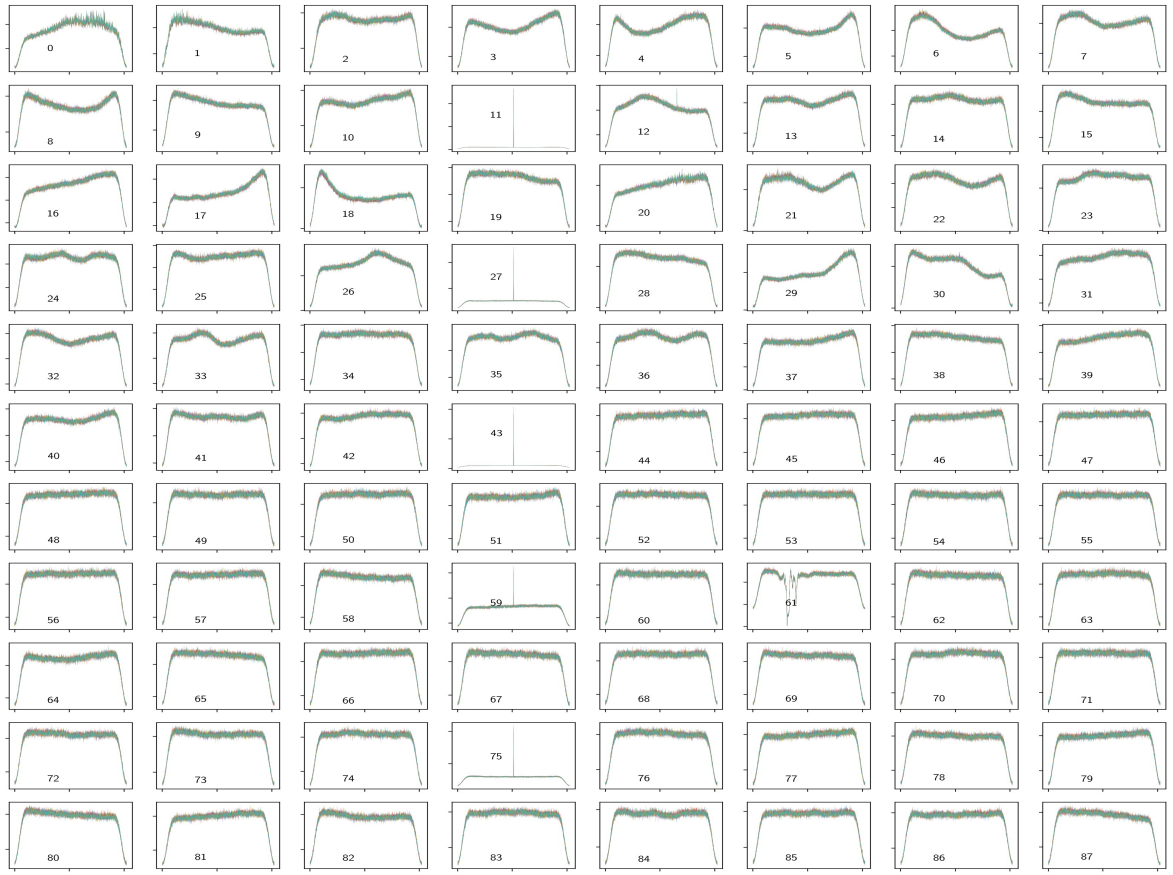

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