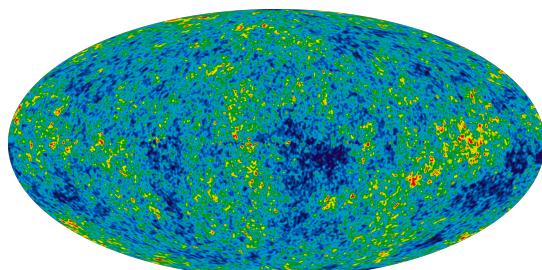
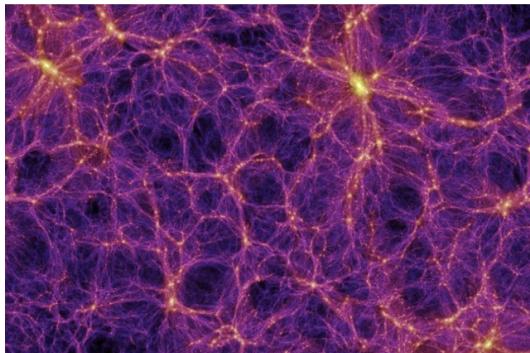


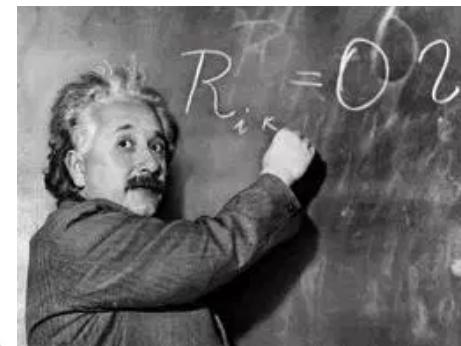
Ellie Kitanidis, PhD Candidate
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The statistical distributions of matter and light in the universe are rich with clues about dark energy, dark matter, general relativity, and other cosmic mysteries!

Large-scale structure

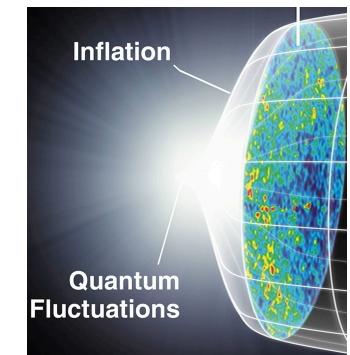


Cosmic microwave background



$<2.2 \text{ eV}$	$<0.17 \text{ MeV}$	$<15.5 \text{ MeV}$	91.2 GeV
ν_e 0 $\frac{1}{2}$	ν_μ 0 $\frac{1}{2}$	ν_τ 0 $\frac{1}{2}$	Z 0 1

electron neutrino muon neutrino tau neutrino weak force



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HPC / Big Data challenges:

- Experiments measure hundreds of millions of galaxies; each involves many different types of data, sources, etc.
- A typical cosmological simulation requires minimum of tens of millions of CPU hours, petabytes of snapshot data
- Calculations of statistical quantities of interest (e.g. n -point correlation functions) scale as N^n or worse
- Not enough human power to keep up with data demands, need scalable AI to automate tasks

Argonne Team Breaks Record with 2.9 Petabytes Globus Data Transfer

July 9, 2019 by staff [Leave a Comment](#)

Today the Globus research data management service announced the largest single file transfer in its history: a team led by Argonne National Laboratory scientists moved 2.9 petabytes of data as part of a research project involving three of the largest cosmological simulations to date. "With exascale imminent, AI on

