

Jacob Hummel

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EDUCATION

Ph.D. Astrophysics, The University of Texas at Austin, 2016

M.A. Astrophysics, The University of Texas at Austin, 2012

Dissertation: “The First Supernovae: Detection and Impact on Early Star Formation”

B.S. Physics with Mathematics minor, Truman State University, 2009

Valedictorian, Summa cum Laude with Departmental Honors

SKILLS

Thoroughly familiar with the *Python* data stack. Proficient coding in *Python*, *C*, *Fortran*, *IDL*, and *Mathematica*. Working knowledge of *SQL*, *Java*, *HTML*, and *UNIX* shell scripting. Familiar with distributed computing frameworks such as *OpenMP* and *MPI*. Extensive experience with exploratory data analysis and out-of-core computing problems. Comfortable with Machine Learning concepts and predictive modeling.

PROJECTS

Designed and developed the *pandas*-based toolkit GADFLY for analyzing simulation data using the *Python* data stack. Built the open-source GADget DataFrame Library to enable exploratory data analysis by easing interoperability with the broader scientific *Python* ecosystem, enabling efficient memory management for out-of-core datasets, and providing highly optimized visualization routines. The package is available on Github at github.com/hummel/gadfly.

Performed extensive exploratory analysis of very large datasets using the *Python* data stack, particularly *Numpy*, *Scipy*, *pandas*, and *h5py*. Constructed analysis tools in *Python* and *C* to explore multi-terabyte datasets and designed insight-generating visualizations using tools such as *Matplotlib*, *Seaborn*, and *Mayavi*. Published multiple peer-reviewed papers on simulations of early star formation in cosmological context.

Designed and integrated a new, highly efficient radiative transport method into the parallel hydrodynamics code GADGET, written in *C* and *Fortran*. Novel approach made studying very high energy radiative backgrounds tractable by dramatically improving algorithmic efficiency. Performed massively parallel simulations on the *Ranger* and *Stampede* supercomputers, generating over 50 terabytes of data for analysis.

EXPERIENCE

Graduate Research Assistant - (2009 – 2016) - UT Austin

Worked closely with others to carry out research in cosmology and computational star formation. Authored four peer-reviewed publications in prominent scientific journals. Presented findings in numerous public and professional talks.