Tianlai Analysis Center @ Wisconsin/Fermilab

19 January 2017

Happy New Year

News

- Tianlai postdoc hire:
  - Santanu Das (IUCAA Pune India)

Important software packages I develop

- SCoPE
  SCoPE(Slick cosmological parameter Estimator is A Markov Chain Monte Carlo (MCMC) code based on global Metropolis algorithm. Besides it uses three unique techniques named as 'delayed rejection' that increases the acceptance rate of a chain, 'pre-fetching' that helps an individual chain to run on parallel CPUs and 'inter-chain covariance update' that prevents clustering of the chains allowing faster and better mixing of the chains. The code is capable of faster computation of cosmological parameters from WMAP and Planck data.
- CMBAns
  CMBAns (Cosmic Microwave Background Anisotropy Numerical Solution) is C program for solving the Cosmological Boltzmann equations numerically and calculating the CMB temperature and polarization power spectrum.
- SuEx
  SuEx (Supersymmetry Explorer) is a C program for calculating super symmetric particle spectrum for Minimal super-symmetric standard model (MSSM). (Paper not yet published)
- I have developed the pipeline for full scan (in real space) and map-making for Cosmic Microwave Background Radiation for WMAP and Plank scan strategy. Our method can scan the sky for any real beam function.
- I have developed code for Bayesian estimation of Statistical Isotropy violation in the CMB sky. This is the first ever work done where the isotropy violation of the CMB sky is detected using a completely Bayesian technique. Our code can be used for estimation of Doppler boost, dipole modulation and many more important factors in cosmology.

List of Publications

Physics and Astronomy

- S. Das and T. Souradeep, "Leakage of power from dipole to higher multipoles due to non-symmetric beam shape of the CMB missions," JCAP 1505, no. 05, 012 (2015) arXiv:1307.0001.
- S. Das, A. Shafieloo and T. Souradeep, "ISW effect as probe of features in the expansion history of the Universe," JCAP 1310 (2013) 016 arXiv:1305.4530.
- S. Das and T. Souradeep, "Suppressing CMB low multipoles with ISW effect," JCAP 1402, 002 (2014) arXiv:1312.0025.
- S. Das, S. Mitra, A. Rotti, N. Pant and T. Souradeep, "Statistical isotropy violation in WMAP CMB maps due to non-circular beams," Astronomy & Astrophysics 591(2016) A97, arXiv:1401.7757
- S. Das and T. Souradeep, "SCoPE: An efficient method of Cosmological Parameter Estimation," JCAP 1407, 018 (2014) arXiv:1403.1271.
- S. Das, S. Mukherjee and T. Souradeep, "Revised cosmological parameters after BICEP 2 and BOSS," JCAP 1502, no. 02, 016 (2015)arXiv:1406.0857.
- S. Das, S. Mitra and S. T. Paulson, "Effect of noncircularity of experimental beam on CMB parameter estimation," JCAP 1503, no. 03, 048 (2015) arXiv:1501.02101.
- S. Das and T. Souradeep, "Dipole leakage and low CMB multipoles," J. Phys. Conf. Ser. 484, 012029 (2014) arXiv:210.0004.
- S. Das, B. D. Wandelt, T. Souradeep, "Bayesian inference on the sphere beyond statistical isotropy", JCAP 1510 (2015) 10, 050.
- N. Joshi, S. Das, A. Rotti, S. Mitra and T. Souradeep, "Estimating SI violation in CMB due to non-circular beam and complex scan in minutes ," JCAP 1603(2016) no.03, 035, arXiv:1511.03672
- S. Mukherjee, P. K. Aluri, S. Das, S. Shaikh, T. Souradeep, "Direction dependence of cosmological parameters due to cosmic hemispherical asymmetry", JCAP 1606(2016) no.06,042, arXiv:1510.00154
- S. Mukherjee, S. Das, M. Joy and T. Souradeep, "Estimation of Inflation parameters for Perturbed Power Law model using recent CMB measurements," JCAP 1501, 043 (2015) arXiv:1410.8835.
- Santanu Das, "Mach's principle and the origin of the quantum phenomenon," arXiv:1206.0923
- Santanu Das, "Mach Principle and a new theory of gravitation," arXiv:1206.6755.
- Santanu Das, "Machian gravity and a cosmology without dark matter and dark energy," arXiv:1205.4055.

News

- First Tianlai data at Fermilab
  - 2 4TB disks arrived Tuesday @ Fermilab
  - data ingestion delayed a few days as I am acquiring new Linux box (MacOS/Windows could not mount these disks - checked that I can read them with borrowed Linux laptop)
- Setting up initial 100TB data storage
  - Expect that it will be available ~ 1 week.
  - (some bureaucratic delays regarding Cooperative Research Agreement with Wisconsin)
  - “Fermilab not use to ingesting non-DOE money”

News

- New mailing lists
  - bao21cm is a non Tianlai specific list!
  - new Tianlai lists:
    - TianlaiAnalysis (should receive notification as soon as setup)
    - any others?
- Bi-weekly videocons (starting next Thurs)
  - will be announces on bao21cm and TianlaiAnalysis.
- Next Week
  - will discuss data specifics.
  - I hope 1st data will be online for everyone to “see”

We will add a new storage group after obtaining management approval, but we will need some information to get started.

Enstore is tape storage service offering operated by the Scientific Computing Division for the Laboratory. Since it is a managed service and it is necessary for us to understand the requirements on its resources, requests to use it must include information about the proposed computing project including the resources required and the length of the project.

1. What do you want the storage group named? This will be the top level pngs directory.
tianlai

2. What computers (at Fermilab) will need the pngs mount exported to?

gerty.fnal.gov (currently offline)
this list will increase/change over time.

3. What will the user id and group id of that top level directory?
stebbins.g134

4. Will files be written from on-site computers or will all access be through dCache?
if will use dCache, please also fill out a request form in Service Now:
Service Catalog > Scientific Data Storage and Access > dCache Storage Request
on-site computers

5. Do you want the data (or some subset) duplicated - enstore can automatically write to 2 tapes in 2 different robot locations.
no that that is not necessary (ACTUALLY IT IS NECESSARY)

6. What are the estimated file sizes? -- would you want to use Small File Aggregation?
Current tape media have 8400G capacity, thus writing small files straight to tape is inefficient.
Currently we use 22GB files but we might work with you if this is too small.

7. How much space is required (in TB)? (I see you noted a PB)
For now we would request 100TB. We may increase this later.

8. How many years to keep the data? (we never remove anything but it's a question on the list)
10 years

9. Do you have an estimate for the volume of data to be written TB/year?
For the calendar year 2017 we project things will ramp up from a very slow data rate to a total of no more than 500TB. I project that we would not reach the 100TB until after mid-year. We will be able to forecast needs roughly a month in advance. I presume that is sufficient to request increased resources as necessary.

10. Will there be peak times when large amounts of data will be written or read?

We project episodic data ingestion, roughly monthly.
11. How many users will be accessing the data?

Less than 20 would have access.