

## Application by Peter Nugent (LBNL & UCB) as Associate Member of the ZTF Collaboration

**Objectives:** The following lays out my application as an Associate Member of the ZTF Consortium. My overarching goals are two-fold: to help the current collaboration members with their science (through follow-up resources, analysis, access to high-performance computing, scientific wisdom gleaned from PTF/iPTF, etc.) and to *explore* possibilities of opening up completely new phase-space in which to search for astrophysical phenomena with ZTF. I would like to help the ZTF Consortium achieve additional science at no added cost. I am completely open to working on different or additional projects the ZTF Consortium would like to pursue with me.

There are two components to this write-up that can be broken down into:

- (1) Associate Application and student thesis projects.
- (2) Access to Keck and/or Lick for ZTF science (for above work).

**Projects:** Currently, I do not have any projects that I would like to lead. I feel I could play a secondary role by helping the following ZTF projects based on my expertise and access to Keck, Lick, etc.: SN Ia Cosmology; Advanced LIGO follow-up; strongly lensed supernovae; microlensing; rates; and the early lightcurves/physics of SNe Ia. I currently have three students who will be conducting thesis work during the era of ZTF. For completeness, I spell out what each is working on and possible relevance to ZTF, though I only anticipate one or two who might actively contribute.

*Abigail Polin:* A 4<sup>th</sup> year theorist who is currently working on radiation-hydrodynamic explosion models for SNe Ia with a particular focus on the early lightcurves. Almost all of her work will be done analyzing previously published supernovae as well as those observed in PTF/iPTF. If needed, she could apply her modeling efforts to ZTF discovered SNe Ia. *ZTF is not part of her thesis.*

*Sarafina Nance:* A 1<sup>st</sup> year empiricist (will decide later on theory or observation - or both) who wants to explore the best ways to find strong lensing systems from photometric data as well as strongly gravitationally lensed supernovae for LSST. Likely will be applying a variety of ML techniques to this effort. Could be useful within ZTF in combination with other survey data such as DECaLS. *ZTF is not currently part of her thesis, but could be if her work proves useful to the collaboration.*

*Michael Medford:* A 3<sup>rd</sup> year observer who would like to work on using ZTF for the search for galactic IMBH's via their lensing of background starlight across the ZTF dataset likely using *tractor* and/or *crowdsourc*e depending on the field (extra-galactic or galactic). His work will also be directly beneficial to those doing stellar

photometry as well as microlensing and he would love to collaborate with either or both groups. *ZTF is directly part of his thesis.*

I currently do not have any postdocs in OIR astronomy, nor do I currently intend to hire one during the three years of ZTF.

**Resources:** As a member of LBNL I have access to Keck and Lick and we are actively looking at designs for instruments using the IR chips we have from the failed SNAP project including a wide-field IR camera as well as ground-layer AO. The DESI project will be operational in 2019, and I see many possible synergies between ZTF and DESI. Computational resources are available from the National Energy Research Scientific Computing Center where we currently have a 30Mhr allocation for PTF/iPTF work – this could be extended to the ZTF members as they see fit.