SEARCH FOR VARIABLE STARS

Brighter

PROF. ROBERT KEHOE

FONDREN SCI. 113; 8-1793; KEHOE@PHYSICS.SMU.EDU

- Stellar astrophysics
 - Pulsating stars

- Eclipsing systems
- Eruptive/cataclysmic stars
- Physics of black hole creation, stellar birth/evolution/death
- Cosmological implications:
 - distance ladder
 - evidence of dark energy





object= 1172, Designation: R0TSE1 J112037.63+392100.4

12.00

12.05

12.10

12,15

12.20

12.25

12.30

dimmer

DEVICES AND DATA

- Robotic research telescopes designed to find optical light of gamma-ray bursts
 - ROTSE-I telephoto array
 - Continuous whole-sky monitoring 1998-2003
 - Preliminary list of 60k variable candidates (to ~14th mag.)
 - I.e. stars that 'seam to vary': very rough indicator
 - Deeper field follow-up data (to ~15th mag.)
 - ROTSE-III worldwide telescope array also designed for supernova searches (2003 onward)
 - One @ McDonald Obs. In Franklin Mtns, TX
 - Potential for SMU students to schedule telescope for specific projects
 - Burst and patrol data to ~20th mag.
 - Very good calibration ('photometry')
- Constant patrolling of sky produces excellent data sample to find many different variable species: largely untapped
- Software tools exist (dev. primarily by U. of Michigan UM)



THE SMU PROJECT

- I. Software setup (A. Gustafson, K. Pearson, C. Fagg)
 - Linux software for astrophysics
 - Interactive Data Language (IDL) setup
 - UM IDL software, and account on UM computers for data access
- II. Obtain list of candidate variables from ROTSE-I data
 - Use 60k list to extract objects of specific types (e.g. δ Scu pulsating variables)
- Next steps

~done

- Use Deeper fields to do same or confirm
 - Preliminary results are possible this semester
- III. Extract precise photometry w/ROTSE-III
 - Final lightcurve properties (e.g. period, amplitude...)
 - Correlation with other surveys (SDSS, 2MASS...)
 - Ultimately a senior thesis and maybe a publication possible
- How can undergraduates benefit?
 - Learning relevant physics
 - Some programming experience: IDL is a tool used widely in industry and various sciences (medicine, biology...)
 - Research experience (statistical and analysis ideas)
 - Potential results/publications



Some computer Experience desired