

Testing new models of M dwarfs

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Abstract. We present our new observing project searching for pulsations in M dwarfs.

1. M dwarfs

Young low-mass main sequence stars are the dominant population in our Galaxy (>70% of all stars). Precise modelling of mechanical and thermal properties of the stars is very important from very wide range of physical and astrophysical reasons: from understanding fundamental physical problems to astrophysical and cosmological implications. Low mass M dwarfs have radius $0.1 \sim 0.7 R_{\text{Sun}}$ Effective temperature is $< 5 \text{ kK}$ and $\log g = 3.5 \div 5.5$. Spectroscopically, they are characterized by strong and wide molecules absorption lines (TiO, VO, H₂O and CO). An understanding of how the stars are born is very crucial aspect to learn the complete theory of formation of M dwarfs. Recent calculations (SK) revealed that young low-mass main sequence stars can show stellar oscillations driven by ϵ mechanism. The mechanism is based on instability of energy production in the chemical reactions so it must work close to the center of these stars. If the perturbations have enough time to grow in amplitude they can cause periodic change in stellar brightness with the period connected to the dynamical time scale.

2. Goals of the project

- (a) to search for stellar oscillations in M dwarfs
- (b) to obtain light curves of those M dwarfs which are components of eclipsing systems
- (c) to detect other types of variability, caused by rotation or chromospheric activity
- (d) to detect planetary transits
- (e) to make all data obtained in this project publically available.

To achieve our goals we plan to perform photometry of a sample of early type M dwarfs with masses between 0.4 and $0.6 M_{\text{Sun}}$. First observations have been performed at Mt. Suhora Observatory and at IRSF in SAAO. Our sample is limited to cool stars only so infrared telescopes are particularly desirable for this project.

To publish all data obtained a database on PHP and MySQL server have been already prepared. It provides information about stars, useful details for observers as well as an interactive tool for making plots of light curve and the Fourier transform. The database is accessible by any web browser at 149.156.24.35/~andy/mdwarfs.

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