ChESS: ChaMP Extended Stellar Survey

Vinay Kashyap, Nancy Evans, Deron Pease, Amy Mossman, Richard Gray, Jeremy Drake, Belinda Wilkes, Paul Green, Dong-Woo Kim, and the ChaMP Collaboration

Smithsonian Astrophysical Observatory, Cambridge, MA 02138

We present a catalog of stellar X-ray sources serendipitously detected in Chandra data from 1999-2001 (XPPE, Kim et al. 2004a, 2004b). We have systematically searched for optical matches to X-ray sources from the Chandra Multi-wavelength Project (ChaMP, Green et al. 2004) using the Tycho, GSC, SDSS, and ChaMP optical follow-up catalog. We find over 200 stellar X-ray sources covering a magnitude range $V = 10$ - 10. This forms an X-ray selected, but otherwise unbiased sample of field stars covering a wide range of spectral types, ages, metallicities, and rotations. We have classified the spectral types of those stars which have optical spectra, and use this set to calibrate the colors of the remainder of the sample. As expected, the majority of the sources are M type stars. We compare the observed number distributions of the stars with that expected from known activity indicators.

![Image of scatter plots showing the relationship between X-ray and optical flux for different spectral types](image)

### SUMMARY
- 20 in Tycho 11 in GSC, 71 in ChaMP followed, 11 in SDSS, 70 sources classified
- 48 in ChaMP 22 in GSC, 11 in SDSS, 70 sources classified
- ChaMP & SDSS data used, with complete catalog of Galaxy
- ChaMP & SDSS data used, with complete catalog of Galaxy
- ChaMP & SDSS data used, with complete catalog of Galaxy

### Activity in M dwarfs
The number of X-ray sources serendipitously identified as all stars based on optical spectrophotometry is shown in the black histogram. Also shown are curves corresponding to the number predicted based on a recent analysis of M ratios in well-defined samples (West et al. 2004) combined with predicted numbers of stars in the Galaxy (Bidelman & Smith 1974). The red curve is a result of the direct conversion from $N_l$, the X-ray, and the green curve includes an additional factor of an activity fraction found by West et al.

![Image of histograms showing the distribution of stars with X-ray and optical flux](image)