The Palomar Transient Factory (PTF) is a new survey for astronomical transients being undertaken with the new wide-field CCD array installed on the Palomar 48" telescope in December 2008. The Orion project is an experiment that during its first year is focusing on a single pointing in the Orion star-forming region as part of the PTF survey. The project has been assigned 40 consecutive nights per year for three years to perform intensive time-series observations with the aim of detecting close-in, Jupiter-sized planets transiting young stars. Little is known about the distribution and frequency of planets around stars that are 1-100 Myr old — the time frame in which the giant planets are expected to form. Our principal goal is to investigate the frequency of planets around stars at these young ages. Observations began in December 2009. Preliminary results based on a few hours from the night of December 19 are reported here.

- 12-CCD array, each 2048 by 4096 pixels.
- Total nominal 7.8 sq. deg. field, 1" pixels.
- Search for young planets, and also provide unique data set for:
  - Eclipsing binary systems
  - Characterizing stellar activity/rotational periods
  - Previously unknown young stars in the Orion region.

### Observations

- Field is chosen centered on 25 Ori cluster:
  - Within 1 a region (shown above) — matches 5—10 Myr disk dissipation age.
  - Not overly reddened/attenuated.
  - Optimizes number of sources without overcrowding.
  - Maximizes fraction of PMS stars (Briceño 2007).
- R band, 30s exposures.
- ~1m 20s cadence, for 40 nights.
- Observations began December 1 2009, currently ongoing.

### Differential Photometry

The results shown here represent some of the preliminary results from one of the 11 CCD chips, over a few hours from the night of December 19 2009. Numerous strongly variable sources are immediately obvious; the RMS vs. magnitude plot shows 1—2% photometry is achievable down to ~R=17, while the example stable stars shown underneath suggest no obvious systematic trends over the course of ~2hrs.

- ~7,800 good sources detected on this chip.
- Completeness limit R~20 in 30s.
- RMS precision ~3mmag at R~13—14, can likely be improved.
- Binning data points improves precision as expected, implying no severe systematics.
- Precision, source count, and magnitude range should all be sufficient to find a few young planets, assuming the same statistics as the current known exoplanet population.

### Preliminary Results

- May also expect more planets from regular field stars in the PTF Orion field.

### REFERENCES

- Chen, J. 2009, Neurocomputing, 72, 1876-1882
- Background image credit: Robert Gendler