Identifying Nearby, Young, Low-Mass Stars with the GALEX and WISE Catalogs

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How To Find Nearby Stars

- Nearby young stars are located in associations and moving groups
- Members share similar distances and Galactic space velocities (UVW)

<table>
<thead>
<tr>
<th>Assoc.</th>
<th>D (pc)</th>
<th>Age (Myr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>β Pic</td>
<td>31±21</td>
<td>12</td>
</tr>
<tr>
<td>Tuc-Hor</td>
<td>48±7</td>
<td>30</td>
</tr>
<tr>
<td>Columba</td>
<td>82±30</td>
<td>30</td>
</tr>
<tr>
<td>Carina</td>
<td>85±35</td>
<td>30</td>
</tr>
<tr>
<td>TW Hya</td>
<td>48±13</td>
<td>8</td>
</tr>
<tr>
<td>ε Cha</td>
<td>108±9</td>
<td>6</td>
</tr>
<tr>
<td>Octans</td>
<td>141±34</td>
<td>20?</td>
</tr>
<tr>
<td>Argus</td>
<td>106±51</td>
<td>40</td>
</tr>
<tr>
<td>AB Dor</td>
<td>34±26</td>
<td>70</td>
</tr>
</tbody>
</table>

(from Torres et al. 2008)
How to Find Young Stars

• Young stars tend to have more active chromospheres

• X-ray selection criteria have been used to identify these stars

• But: ROSAT All-Sky Survey (RASS) did not go very deep

• But: Pointed XMM/Chandra observations do not cover a large area
Galaxy Evolution Explorer Satellite

- Ultraviolet space telescope launched April 2003

- Observes at FUV (1344-1786Å) and NUV (1771-2831Å)

- Studied galaxies and their evolution through time, but has also yielded more 'local' results
0.1% of all GALEX NUV & FUV sources, with young stars overlaid
Young Stars with GALEX+WISE
Proper Motions from WISE-2MASS Astrometry
2MASS/WISE-based Empirical Isochrones

- TWA members (Schneider et al. 2012)
- Age<=12 Myr stars (Torres et al. 2008)
- Pleaides members (Stauffer et al. 2007)
- Cool field dwarfs (Dupuy & Liu 2012)

DZ Cha
UVW Selection
• ~200 candidates selected with estimated 10 Myr-old distances < 150 pc and broad range of good radial velocities (>15 km/s)
Spectral Types

Brown dwarfs with known spectral type from Kirkpatrick et al. (2011)
A Quick Check

- Six systems have spectra listed in Riaz et al. (2006)
- Comparing with standards from Nidever et al. (2002) we get a rough measure of the radial velocity
Bonus: warm disks

![Graph showing normalized flux vs wavelength for different wavebands (J, H, K, W1, W2, W3, W4). The graph illustrates the variations in flux across different wavelengths.]
Conclusions

• The combination of GALEX+WISE+2MASS is a powerful tool for the identification of young, low-mass stars

• Early results show many promising candidates. Spectroscopic observations will confirm them.