This material is a short summary on the observation scheme and candidates estimation of the AST3 exoplanet searching program. Please contact me (huizhang@nju.edu.cn) without any hesitation if you got any suggestion or correction.

- **Overview of the south sky**

  Known open clusters on the south sky: 1051
  Known exoplanets on the south sky: 394

  **Within the AST3 searching area, Dec \(\leq -60\) degree:**
  
  Open clusters: 211
  Exoplanets: 64
  Hot Jupiters with their period < 10 days: 11
AST3 observation zones (a preliminary design)

To find exoplanet candidates as many as possible in the first 3 years, we focus on the galaxy plane area where the star density is about $10^4$/degree$^2$. The area is divided into 4 blocks and each of them is composed of several observation zones. Each zone consists of 12 FOVs (about 1.5x3 degree$^2$). The 4 blocks cover about 900,000 known objects with magnitude from $m_v=8$ to $m_v=14.5$ (according to the PPMX catalog).

AST3 observation strategy (a preliminary design)

The exoplanet search lasts 42 continuous days every observation season (the polar winter at dome A, Antarctic). To cover both short period (<3days, typical transit duration ~1-3hours) and moderate period (3~30days, typical transit duration ~3-6hours) transiting planets, the observation contains two cadences:

- **Short cadence:**
  - exposure time: 30s
  - pointing, readout and redundancy: 15s
  - scan 12 FOVs continuously among 1 zone
  - cadence: $45s \times 12 = 540s = 9m$

- **Long cadence:**
  - exposure time: 30s
  - pointing, readout and redundancy: 15s
  - scan 24 FOVs continuously among 2 zones
  - cadence: $45s \times 24 = 1080s = 18m$
Observation time schedule:

- Day 1 - 3: scan zone No.1, Short cadence, 5760 images
- Day 4 - 6: scan zone No.2, Short cadence, 5760 images
- Day 7 - 42: scan zone No.1 and No.2, Long cadence, 67200 images

- **AST3 demonstration test**

Photometric accuracy of AST3 with 30s exposure time:

- 0.1% at $m_v \leq 11$;
- 0.5% at $m_v \leq 13.5$;
- 1% at $m_v \leq 14.5$.

- **Total candidates expected to be found by AST3**

According to Kepler’s results:

<table>
<thead>
<tr>
<th>Photometric accuracy</th>
<th>Frequency of Exoplanet</th>
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</thead>
<tbody>
<tr>
<td>1%</td>
<td>0.047%</td>
</tr>
<tr>
<td>0.5%</td>
<td>0.085%</td>
</tr>
<tr>
<td>0.1%</td>
<td>0.28%</td>
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</tbody>
</table>
Total candidates expected:
42 days/year, 3 years, 1 or 2 AST3 units

<table>
<thead>
<tr>
<th>Planet size</th>
<th>Expected number</th>
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<tbody>
<tr>
<td>&gt;Jupiter</td>
<td>&gt; 400</td>
</tr>
<tr>
<td>Neptune - Jupiter</td>
<td>~ 250</td>
</tr>
<tr>
<td>SuperEarth - Neptune</td>
<td>~ 150</td>
</tr>
<tr>
<td>Total</td>
<td>&gt; 750</td>
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