Summary. — BOOTES-IR is the extension of BOOTES (Burst Observer and Optical Transient Exploring System) to the near-infrared (NIR). The system includes a complete robotic observatory control system (RTS2), and real time reduction and analysis tools (JIBARO) that will allow us to automatically identify GRB afterglow candidates. The BOOTES-IR telescope is a fast-slewing 0.6 m Ritchey-Chrétien, currently operational with an optical camera. The NIR camera, with 1K × 1K pixels and a field of view of 12′ × 12′, will see first light before the end of 2006, and the telescope will then observe in optical and NIR wavelengths simultaneously via a dichroic.

PACS 95.55.Cs – Ground-based ultraviolet, optical and infrared telescopes.
PACS 95.75.Rs – Remote observing techniques.
PACS 95.85.Jq – Near infrared.
PACS 98.70.Rz – γ-ray sources; γ-ray bursts.

1. – BOOTES

BOOTES (Burst Observer and Optical Transient Exploring System [1]) is a network of small robotic telescopes in southern Spain, operating since 1998. All operations are
fully automatic, controlled by the same custom software (RTS2 [2]), and responds directly to GCN alerts. The resulting data is fed to rapid image reduction and analysis software (JIBARO [3]) developed for optical BOOTES and now extended for the NIR. It produces reduction, astrometry, photometry and transient detection quickly and automatically, and positions of GRB afterglow candidates are immediately sent to the project scientist.

BOOTES-IR is the fourth site, the largest telescope, and the first near-infrared instrument in the project. The telescope is a fast-slewing 0.6 m Ritchey-Chrétien design working at $f/8$, able to point at any part of the sky within 20 seconds, with a typical slew time of 5 seconds. It is currently operating fully robotically with an optical camera, and the NIR camera is expected to see first light before the end of 2006.

The NIR camera is based on a Rockwell HAWAII array—a $1024 \times 1024$ pixel HgCdTe detector sensitive from 0.8 to 2.5 microns, cooled by liquid nitrogen. The pixel scale in BIRCAM is $0.7''$ for a field of view of $12' \times 12'$. The camera has an 8-slot filter wheel, expected to provide J, H, K, Z, Y, H2 and Brγ filters, and the predicted limiting magnitudes for the J, H and K filters are shown below.

<table>
<thead>
<tr>
<th>$T_{exp}$</th>
<th>$J(10\sigma)$</th>
<th>$J(5\sigma)$</th>
<th>$H(10\sigma)$</th>
<th>$H(5\sigma)$</th>
<th>$K(10\sigma)$</th>
<th>$K(5\sigma)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5s</td>
<td>15.5</td>
<td>16.3</td>
<td>14.3</td>
<td>15.1</td>
<td>13.1</td>
<td>13.9</td>
</tr>
<tr>
<td>30s</td>
<td>16.4</td>
<td>17.2</td>
<td>15.2</td>
<td>16.0</td>
<td>14.1</td>
<td>14.8</td>
</tr>
<tr>
<td>600s</td>
<td>17.3</td>
<td>18.0</td>
<td>16.3</td>
<td>17.1</td>
<td>15.4</td>
<td>16.1</td>
</tr>
</tbody>
</table>

2. – Science

The NIR camera will be able to detect high redshift events and afterglows happening in highly extincted regions that would appear invisible in optical wavelengths. This makes a NIR camera ideally suited for GRB afterglow studies. Combined with optical BOOTES, we will have multiband observations allowing us to study the evolution of the prompt spectral energy distribution.

As GRB followup observations will take up a small fraction of the available time, “secondary science” programmes are foreseen, ranging from study of solar system objects (minor planets, comets), galactic sources (active stars, brown dwarfs, X-ray binaries and micro quasars) to the extragalactic zoo (AGNs, QSO, Supernovae). Using the provisional optical camera, some programmes have already started to produce results [4, 5].

* * *

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REFERENCES