

# BOOTES: a stereoscopic robotic ground support facility

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## 1. Introduction

BOOTES, the **B**urst **O**bserver and **O**ptical **T**ransient **E**xploring **S**ystem, is mostly a Spanish–Czech international collaboration that works to fill in the space that actually exists in rapid variability Astronomy. It is specially aimed towards the detection and study of the optical transients that are generated in conjunction with the elusive GRBs (Gamma Ray Bursts). It saw first light in 1998 (Castro-Tirado et al. 1996), being one of the pioneering robotic observatories for OT (Optical Transient) follow ups (Castro-Tirado et al. 1999).

Its main scientific objectives include: i) Simultaneous and quasi simultaneous observations of GRB error boxes, ii) detection of optical flashes of cosmic origin: either related to new astrophysical phenomena (i.e. large-amplitude flare stars and large-amplitude AGN flares) or to GRBs undetected from their gamma ray emission (orphan afterglows/transients), iii) sky monitoring in the *I*, *R* & *V* bands, and iv) discovery and study of meteors, asteroids, comets, variable stars, novae, supernovae ...

Although it was first thought of as a tool to perform rapid searches of GRB optical counterparts, BOOTES has also participated in the study of meteor storms. Additionally, it has accumulated an enormous database of sky images (1998–2004) to study objects which exhibit short lived variations.

## 2. A stereoscopic system

There are two 250 km distant BOOTES stations. Thus, using parallax, it can discriminate against near Earth detected sources up to a distance of  $10^6$  km.

BOOTES-1 in Mazagón (Huelva) has two domes (1A and 1B), three Schmidt-Cassegrain telescopes and several wide field cameras. Following complementing schemes, all instruments carry out systematic explorations of the sky each night.

BOOTES-2, located near Málaga is in operation since 2002. It has one 30cm telescope with an attached wide-field camera. The station may observe in standalone as well as in parallel stereoscopic together with BOOTES-1 (Mateo Sanguino et al. 2003).

Both stations are operated under the RTS2/Linux control system. Amongst the recent instrumentation developed, a wide-field low-resolution spectrograph with a field of view of 30 arcmin, with a resolution of 50 Å in the red part of the spectrum, and 10 Å in the blue part, is available. The limiting magnitude is  $R = 13$  (de Ugarte Postigo et al. 2003).

## 3. Scientific Results

Since 1998 has BOOTES responded to more than 60 GRB triggers with different results (Castro-Tirado et al. 2002, Hurley et al. 2002, Klose et al. 2004). The majority of the follow ups have provided upper limits to the GRB optical emission despite of the prompt response, thus ratifying the elusiveness of these phenomena. Additional information can be found in <http://laeff.inta.es/BOOTES/>.

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