*The B[e] Phenomenon: Forty Years of Studies*
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# Observations of Newly Found Objects With the B[e] Phenomenon

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**Abstract.** The B[e] phenomenon has both photometric and spectroscopic signatures. Photometrically it manifests itself by a large infrared excess due to radiation of the circumstellar dust that can serve as a selection criterion for finding new candidates in large photometric databases. We searched all-sky catalogs, which contain optical and near-IR magnitudes, and selected over 100 candidates. Nearly 40 objects from this sample have been observed spectroscopically and photometrically in the optical and near-IR region. We present a list of those with detected hot star features and forbidden line emission and suggest their possible nature and evolutionary status.

## 1. Introduction

The B[e] phenomenon is the simultaneous presence of line emission (forbidden: [O I], [Fe II], [N II], and sometimes [O III] and permitted: Balmer, Fe II, etc.) and large IR excesses due to hot CS dust in the spectra of B–type stars (Allen & Swings 1976). It is found in five stellar groups (Lamers et al. 1998): pre-main-sequence stars, symbiotic binaries (a cool giant and a white dwarf or a neutron star), compact Planetary Nebulae, supergiants, and FS CMa type objects (Miroshnichenko 2007). Precise classification and fundamental parameters determination of many objects with the B[e] phenomenon is difficult due veiling of the stellar features by the circumstellar material.

We searched for new objects with the B[e] phenomenon by cross-correlating catalogs of stellar positions and photometry (optical and near-IR) using our photometric criteria (see Kuratova et al., this meeting). Nearly 100 Galactic candidates have been found, ~40 of them have been observed spectroscopically (mostly at low resolution) and photometrically (*UBVR*). Near-IR photometry of many of these objects is reported by Arkharov et al. (this meeting).

## 2. Observations

Spectra were taken in 2007–2015 at the following telescopes: 1.52-m at Bologna Observatory (Italy, optical, R~800–1500), 1.82-m at Asiago Observatory (Italy, optical, R~800–1500), 2.12-m telescope of the Observatorio Astronomico Nacional San Pedro Martir Observatory (Mexico, optical, échelle, R = 18000, Boller-Chivens, R~1000), 3-m telescope at Lick Observatory (USA, 0.46–2.5 $\mu$m, R~700), 2.7-m Harlan J. Smith telescope at McDonald Observatory (USA, 0.36–1.05 $\mu$m, R~60000) – a spectrum of MWC 790, 3.6-m Canada-France-Hawaii Telescope (Mauna Kea, USA, 0.36–1.05 $\mu$m, R~60000) – a spectrum of MWC 1051. *UBVR* or *BVR* photometry for several objects was obtained at two 1-m telescopes of the Tien-Shan Astronomical Observatory (near Almaty, Kazakhstan).

## 3. Results

Eighteen stars with a strong IR excess have been found to show the B[e] phenomenon. Ten objects show the IR flux declining toward longer wavelengths with $\mathrm{d}[\log(\lambda F_\lambda)]/\mathrm{d}(\log\lambda) \leq -1.0$, typical of FS CMa objects: IRAS 01571+6018, IRAS 06148+3054, IRAS 19156–0935, IRAS 19552+3005, IRAS 22216+5722, AD Tau, KT Cyg, MWC 482, MWC 1051, [KW97] 60–35 (Kohoutek & Wehmeyer 1999). Eight objects show a flat IR excess and are most likely Young Stellar Objects: MWC 790, IRAS 02258+6102, IRAS 02551+6042, IRAS 03054+6047, IRAS 05481+2541, MWC 485, [KW97] 12–39, [KW97] 13–32. Objects with the strongest IR excess and a strongest IR flux decline are IRAS 19156–0935 and [KW97] 60–35. Our initial estimates show that most of the underlying stars are B–type stars, while AD Tau and IRAS 19156–0935 are early A-type stars.

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