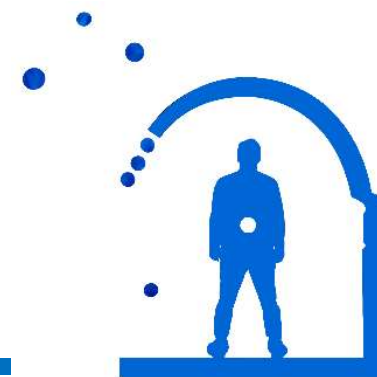


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# The IACOB spectroscopic database

*New interface and second data release*



**Abstract:** *After almost 12 years gathering data with the 2.56m Nordic Optical Telescope and the 1.2m Mercator telescope, the IACOB project has broken the record of compiling high quality, multi-epoch, optical spectra for more than 1000 Northern Galactic O- and B-type stars. To celebrate this important milestone, in this contribution to the first virtual meeting of the Astronomical Spanish Society (SEA), we summarize the main characteristics of the present version of the IACOB spectroscopic database, introduce the renewed interface to access the data, and announce the second data release (including more than 550 spectra of about 250 mid- and late-B dwarfs, subgiants and giants).*

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IACOB is an ambitious long-term observational project which is contributing to the new era of investigation of massive stars by concentrating on **Galactic OB stars**. More specifically, the main scientific goal of the project is to provide a complete **empirical overview** of the **physical properties** of a **statistically significant sample** of OB stars. In particular, the ultimate driver is that the compiled information can be used as definitive **anchor point** for our theories of stellar atmospheres, winds, interiors and evolution of massive stars.

In this endeavor, we are benefiting from:

- several **high-resolution spectrographs** attached to 1-3 m telescopes in the Canary Islands observatories;
- state-of-the-art tools and techniques to perform single snap-shot and multi-epoch **quantitative spectroscopic analyses** (providing accurate estimates for the stellar/wind parameters, rotational velocities, abundances, as well as information about stellar phenomena giving rise to spectroscopic variability such as binarity, pulsations, rotational modulation, and wind variability);
- parallaxes and proper motions provided by the **Gaia** mission; and
- photometry provided by the **TESS** space mission.

Some, more immediate drivers of the project are:

- building a **large database of high-resolution, multi-epoch spectra of Galactic OB stars**;
- increasing the statistics of Galactic OB stars with **accurate physical parameters and abundances**;
- Exploiting this database to investigate **open questions** in our knowledge of the **physical properties** and **evolution of massive stars**.

As a plus, we are providing a **ground-based spectroscopic database supporting/complementing** the observations delivered by the **Gaia** and **TESS** space missions in the OB star domain.

This contribution focuses on the



- At present, the IACOB spectroscopic database includes spectra gathered with two different instruments:
  - the **FIES** spectrograph ( $R=25000/46000/65000$ ) attached to the 2.56-*m* Nordic Optical Telescope, and
  - the **HERMES** spectrograph ( $R=85000$ ) attached to the 1.2-*m* Mercator telescope.
- Observations started in **Nov. 2008** and have continued regularly since then.
- Both instruments provide a complete wavelength coverage between **3800 Å** and **7000 Å** (**9000 Å** for the case of all HERMES spectra and those NOT spectra obtained since May 2017).
- By May 2020, the database comprises **8613 spectra of 1035 stars** covering the spectral type range **O4-B9 (all luminosity classes)**
- By default, all spectra in the IACOB spectroscopic database are reduced using the corresponding available pipelines.
- All spectra are made available in **fits format**. Each file includes:
  - the original header plus some extra entries at the end of the header indicated in the form I-EXTRA\_KEYWORD
  - the **original** wavelength calibrated, blaze corrected, merged spectrum (as provided by the pipelines)
  - a **normalized** spectrum (using own routines developed in IDL)

**DR1:** This data release – which includes 681 FIES spectra of 87 stars compiled during 8 nights in Nov. 2008 and Nov. 2009 – mainly refers to the spectroscopic time-series of O stars and early B-supergiants presented in *Simón-Díaz et al. (2010)*, and the spectra of 13 narrow line early-B dwarfs in the Orion OB1 star-forming region analyzed in *Simón-Díaz (2010)* and *Nieva & Simón-Díaz (2011)*.

**DR2:** This new data release includes 552 FIES and HERMES spectra for more than 240 late- and mid-B stars with luminosity classes V, IV, and III observed in the framework of the IACOB project since 2008 and 2020. Part of this observations were considered for the investigation of the macroturbulent broadening in the whole O and B star domain presented in *Simón-Díaz et al. (2017)*.



Brand new!!

## Welcome to renewed interface of the IACOB spectroscopic database!

IACOB is an ambitious long-term observational project whose main scientific goal is to provide a complete and statistically significant empirical overview of the physical properties of **Galactic massive OB-type stars**. The ultimate objective of the project is that the compiled information can be used as a strong and long-lasting anchor point for our theories of stellar atmospheres, winds, interiors and evolution of massive stars.

This is the interface to have access to the spectra compiled during more than 12 years in the framework of the IACOB project: the so-called **IACOB spectroscopic database**. While not all the spectra are publicly available yet, we quote all the compiled observations for reference purposes, The different data releases (DRx) will be conveniently announced; in the meanwhile people interested in specific (samples of) spectra can contact the PI of the project by email: [ssimon \[at\] iac.es](mailto:ssimon@iac.es).

More details about the project can be found in the [project webpage](#).

The IACOB spectroscopic database mainly comprise observations made with the FIES instrument attached to the 2.56-m [Nordic Optical Telescope](#) and the HERMES spectrograph attached to the 1.2-m [Mercator Telescope](#). See above for some technical details of the database. In future developments, we plan to also incorporate data of Southern Galactic OB stars as obtained with the FEROS instrument and gathered from the [ESO public archive](#).

<b>Search by name</b> Star name (Rigel, etc.)	<b>Spectral type</b> e.g.: B1* or O* or *V*	<b>Data Release</b> Any	<b>Instrument</b> Any	<input type="checkbox"/> Only spectra available to download
<b>Search by coordinates</b> hh:mm:ss dd:mm:ss	<b>Radius</b> 2 arcmin	<b>V mag range</b> 0 to 14	<b>Time range (HJD-2400000)</b> Min HJD to Max HJD	<input type="checkbox"/> Only the best spectrum per star

[Search](#)

★ 1035 Stars

📊 8613 Spectra

Improved engines for searching and downloading spectra

All stars/spectra in the database are listed, but only those spectra in DR1 and DR2 can be downloaded at present.

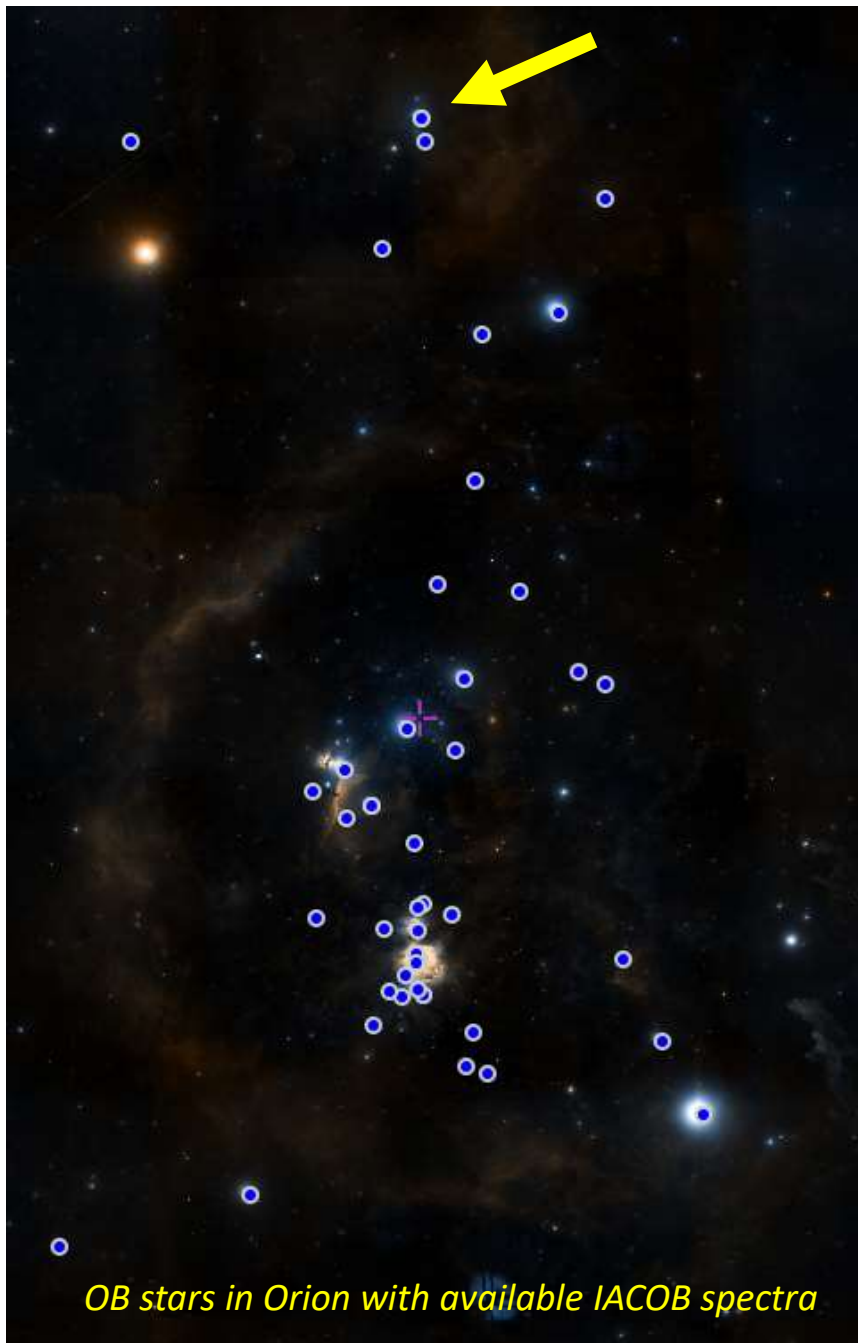
From now on at least one new data release per year is envisaged.

People interested in specific (samples of) spectra not yet included in the DRs can contact the PI of the project by e-mail:

*ssimon [at] iac.es*

<http://research.iac.es/proyecto/iacob/iacobcat/>



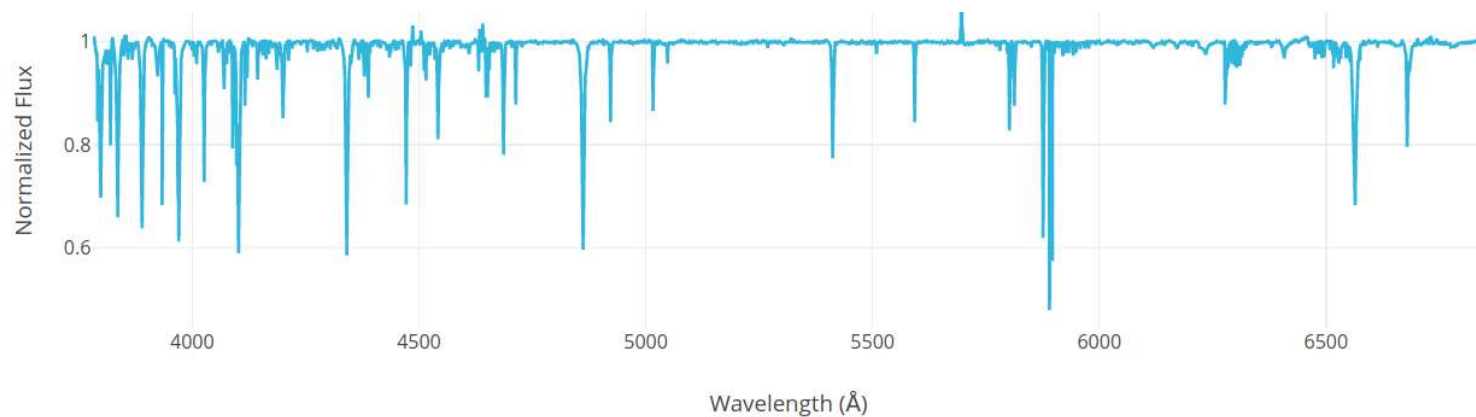
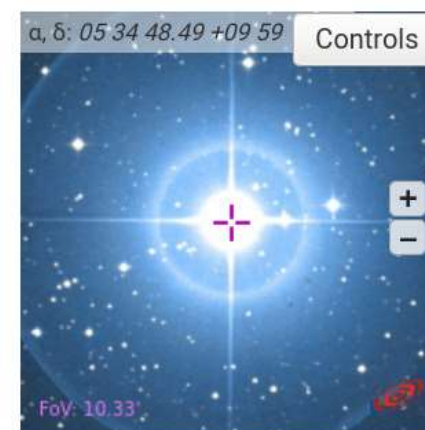


OB stars in Orion with available IACOB spectra

### HD36861

Name	HD36861
Coordinates (J2000)	$\alpha$ : 05:35:08.0 $\delta$ :+09:56:03.1
Bmag	3.48
Vmag	3.47
Spectral class	O8III((f))

[View in Simbad](#)



Interactive preview of a downgraded version of the best S/N spectrum for each stars in the database.

Use of Aladin Lite apps to help identifying neighboring stars or locating all IACOB stars on the sky

Brand new!!

- Next data release (envisaged for Spring 2021) will include the best S/N spectra of all stars considered for the PhD thesis work of Gonzalo Holgado (*Spectroscopic and physical characterization of the Galactic O-type stars targeted by the IACOB and OWN surveys* – ULL/IAC, Spain, Jan. 2019). More information about the complete dataset utilized by Gonzalo – comprising **2900 FIES, HERMES and FEROS spectra of 415 Galactic O-type stars** –, as well as some results obtained up to date from its scientific exploitation can be found in *Holgado et al. (2018, 2020)* – see also <http://research.iac.es/proyecto/iacob/pages/en/phd-thesis.php>
- As part of the PhD work of Abel de Burgos (*On the evolutionary nature of massive B-type supergiants: a modern empirical reappraisal using data from IACOB, Gaia, and TESS*, ULL, Spain, started Oct. 2019), we are presently increasing by a factor 3 the number of early B-type supergiants (BSGs) in the IACOB spectroscopic database. We plan to (1) obtain at least **3 epochs** of all Northern **Galactic early BSG** brighter than B=9, and (2) incorporate to the database all BSG in the **ESO-FEROS public archive**.
- Some of the spectra in the IACOB spectroscopic database are presently being used to feed other on-going efforts to build some complementary spectroscopic databases of massive stars: such as **LiLiMarlin** (P.I.: J. Maíz Apellaniz), **IACOBsweG** (P.I.: I. Negueruela) or **ASTRO+** (P.I.: Marco).
- We plan to also incorporate to the database all the **long-term, high and medium cadence, spectroscopic time series** gathered in the framework of the IACOB project with the **Hertzprung-SONG** 1m telescope and the SES spectrograph attached to the **STELLA 1.2m** telescope. We highlight that some of this observations – including more than **10000 spectra of about 40 O-type stars and BSGs** – have been obtained in **contemporaneous/simultaneous** mode with **TESS**.
- As part of the ASTRO+ project (P.I.: Marco), we are presently developing a big database of empirical information of massive stars, partially obtained from a detailed quantitative spectroscopic analysis of all stars in the IACOB spectroscopic database.