

# Deciphering Starlight



In Europe, many amateurs are engaging in professional-level research.

CONVENTO GROUP / THOMAS EVERSBERG



## Jan Hattenbach

**An unusual group of tourists** visited Tenerife in the Canaries this summer.

These people were not attracted by the island's beautiful beaches and volcanoes. Instead, they came to work arduous night shifts on a professional 31-inch telescope, just to observe three inconspicuous stars in Cygnus. And each of these amateur astronomers was willing to shell out \$1,300 for travel and to rent the telescope. "To these volunteers, working at a professional observatory is the greatest thing imaginable," says team leader Thomas Eversberg. "Yes, we're somewhat crazy, but what amateur astronomer isn't?"

Many amateurs would agree with this assessment. But why make amateur astronomy a costly and stressful exercise? It's supposed to be fun, right? Obviously, for some it means a lot more.

## Studying Stellar Winds

The recent advent of professional survey telescopes has diminished the backyard observer's opportunity to contribute scientifically in certain areas, such as asteroid and comet discovery. But the emergence of inexpensive, high-resolution, off-the-shelf spectrographs is filling the gap. Even when coupled to modest-size telescopes, spectrographs can yield scientifically useful results by revealing a star's temperature, chemical composition, and prevailing physical conditions of atomic excitation and ionization.

Using the 31-inch reflector of the Institute of Astrophysics of the Canaries, Eversberg and his colleagues

**NOT JUST A TOURIST SITE** European amateurs flock to the island of Tenerife to use the 31-inch telescope housed in this dome. Owned by Spain's Institute of Astrophysics of the Canaries, the observatory sits at an elevation of 2,390 meters.



observe three Wolf-Rayet stars in Cygnus named WR 134, 135, and 137. Their photospheres are shrouded by dense gas clouds that move and rotate at high velocities. A visual observer won't notice anything unusual about these stars, but the clouds produce bright emission lines in the stellar spectra. By studying these lines, astronomers explore the connection between the stars' hidden surfaces and their powerful winds, and test for periodicities and random clumping in these winds.

"We're a textbook example of pro-am collaboration in astronomical spectroscopy," says Eversberg, who works for the German Space Agency in Bonn, but who does this spectroscopy research on a volunteer basis. Eversberg initiated the campaign with Anthony Moffat (University of Montreal, Québec). In 2009 they motivated amateurs to visit Tenerife to observe the periastron of the ultra-hot binary WR 140, the best-studied member of a class of objects called *colliding-wind binaries* (*S&T*: April 2011, page 28). The campaign yielded five times more spectra than a solely professional periastron campaign in 2001. With this amateur data, astronomers improved their knowledge of the system's mass, orbital period, and orbital inclination.

With colleagues from around the world, Eversberg and Moffat formed the ConVento group, comprising professionals and amateurs dedicated to stellar-wind phenomena (ConVento is Italian for "with wind"). ConVento members mostly use their own backyard observatories, but operating the professional facility on Tenerife has been the highlight of the campaign. "Our success in 2009 facilitated our proposal to acquire observation time for the 2013 campaign," says Eversberg. "Professionals know us now, and they know what we're capable of."

### Catching One-Time Events

Professionals have access to the most advanced telescopes and instruments at the world's best observing sites, but they lack what amateurs possess in abundance — time. Long-term measurements, surveys, and monitoring require weeks or even months of telescope time, which are difficult to obtain at overbooked professional observatories. An 8- to 20-inch telescope coupled with an off-the-shelf spectrograph does the job just as well. Taking spectra of bright stars is possible even under light-polluted urban skies. And if you're clouded out one night, your colleagues will help out.

Spectroscopy has thus become a new and thriving field of "citizen science," especially among European amateurs. Though growing, the numbers are still comparatively small. "There are about 30 serious observers in France right now, with maybe another 100 people interested in the field," says Thierry Garrel, a member of the French Astronomical Ring for Access to Spectroscopy (ARAS), the most active amateur organization on the continent.

But those dedicated few are absorbed by their work. "Spectroscopy can be a dull exercise," says Eversberg.



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**AMATEURS GO PRO** *Top:* European amateurs have earned considerable observing time on this 31-inch professional reflector on Tenerife. They use it to take spectra of Wolf-Rayet stars and binary systems with energetic colliding stellar winds. *Center:* German astronomer Thomas Eversberg has coordinated this impressive amateur science campaign. *Bottom:* German amateur Daniel Weiss works in the observatory's control room.