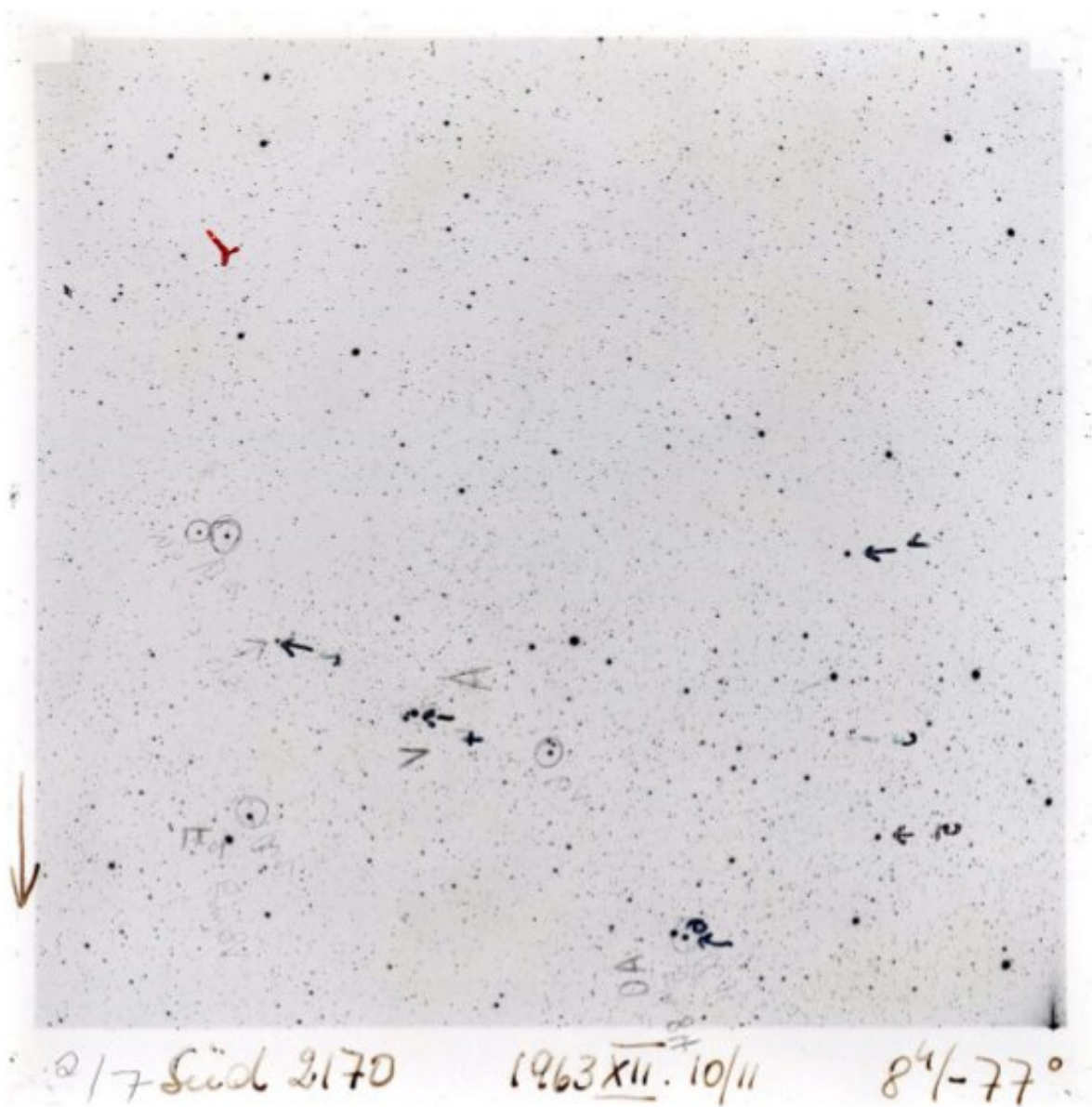


Web archive with astronomical photographic plates goes online

July 8 2022, by Blandina Mangelkramer



Example of a photographic plate. Credit: APPLAUSE archive, <https://www.plate-archive.org/>

Lots of little dots with no apparent pattern: Where laypeople may just see milky gray photos sprinkled with what look like random crumbs, it is enough to make astronomers' hearts miss a beat. We are talking about historical photographic plates showing negatives of the night sky. Together with the Leibniz Institute for Astrophysics Potsdam and the universities of Hamburg and Tartu (Estonia), researchers at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) have digitized the images and published them online. After 10 years, the project has now been completed successfully.

Even though the oldest image is only 129 years old, just a blink of an eye compared to the timescales usually associated with astronomy, they are of great historical value and are a treasure trove for academic purposes. Images such as these are the only way astronomers today can trace how stars move or change in intensity over several decades. They can be used to answer new research questions and take a closer and more objective look at millions of stars.

Since 2012, the research team has been working on digitizing images from the archives of their partner institutes dating from 1893 to 1998 in the database APPLAUSE—which stands for Archives of Photographic Plates for Astronomical USE—and recording them in a catalog with details on the images such as date, section of sky and where the images were taken. In addition, the [research consortium](#) has developed software that uses [artificial intelligence](#) to remove errors on the plates caused by scratches or dust and to calibrate the images, thereby allowing them to be compared with each other for scientific purposes for the first time. Researchers across the globe now have access to 4.5 billion

measurements of celestial light sources for their research.

More than 94,000 photographic plates digitized

A major share of the total of 94,090 plates is accounted for by the 40,000 [photographic plates](#) from the Dr. Karl Remeis Observatory Bamberg, Astronomical Institute of FAU. These include photographs taken by Franconian researchers between 1963 and 1976 at observatories in the [southern hemisphere](#). These unique images show the southern sky, and are the only ones of their kind available anywhere in the world, as no other astronomical projects documented this part of the sky during this period. Since the last images were published four years ago, the photographic plates taken in Bamberg between 1912 and 1968 showing the northern sky have now been added to the project. These 17,600 images are the most important addition to what is now the final data update.

But that is not all: the project came to the attention of other observatories during an academic conference in Bamberg—the Thüringer Landessternwarte Tautenburg, for example. It gave the research team access to the archive of the Karl Schwarzschild Observatory, the former observatory of the Academy of Sciences of the GDR for the years from 1960 to 1998. Researchers at the astronomical observatory of the Vatican State in Castel Gandolfo also expressed an interest in having their archive incorporated into the database and made available to the global scientific community.

New knowledge from old images

But what knowledge can be gained from the historical photographic plates, and does it have any relevance for today? The surveys of the northern and southern skies conducted during the last century by the

Bamberg observatory aimed to investigate stars that varied in intensity. The [physical properties](#) of some of the objects, in other words which gases they are composed of, are still unclear. Star "HD49798" is a particularly interesting example. Its erratic fluctuations in intensity were registered on the photographic plates from Bamberg in the 1960's and early 1970's, but scientists were only able to analyze them last year. They show that the star constantly increased in intensity between 1964 and 1965, but then started to shine less brightly until 1974. There were also rapid changes in the light it gave off within a space of just a few days.

In 1999, satellite readings revealed that the star was emitting X-rays. Today, scientists suspect that these rays are being emitted by an invisible, more compact accompanying object, possibly a neutron star. Until now, scientists had been unable to track long-term variations in intensity, as measurements stretching over such a long period of time, namely ten years, were not available. The historical data from the photographic plates are therefore a valuable source of astronomical information that researchers will now analyze over coming years. This particular duo of stars is still the only constellation of its kind to have been discovered anywhere in the universe.

More information: Access to the published data from APPLAUSE: www.plate-archive.org/

Detailed report on interim results: www.fau.de/2018/10/news/wissen...lung-der-fau-online/

Provided by Friedrich–Alexander University Erlangen–Nurnberg

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