



# WIYN OBSERVATORY

WISCONSIN INDIANA YALE & NOAO

## Newsletter

January 2012

### Director's News

Welcome to the revival of the WIYN Newsletter! It's been a long time coming (the last issue was October 2009), but I hope that we'll be able to resume reporting out to our community twice a year what all has happened, is happening, and will be happening at WIYN. And right now there's a lot to tell!

So let me start with science! WIYN conducted its first-ever consortium-wide Target of Opportunity (ToO) program on supernova SN2011fe, the closest Type Ia supernova in decades, beginning August 26, 2011 and continuing at the beginning of almost every night (weather permitting) through October 19, 2011. NOAO scientists Dick Joyce and Lori Allen took the lead on obtaining observations. (See the science highlights article in this issue.) Personally, I would like to thank the many observers of the entire consortium and enthusiastic support of this program! A paper is about to be submitted with the data, and all observers whose time was used to obtain data will be co-authors. This campaign was possible because WHIRC is currently always mounted on the telescope (except during routine maintenance), and really highlights the flexibility WIYN has with multiple ports.

I should note that our 3.5m telescope also was one of the supporting facilities that provided key observations that led to the discovery of dark energy. Participants in this discover were awarded the Nobel Prize in Physics in 2011. Big science definitely benefits from medium-sized telescopes like ours!

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### Blue Stragglers Shown to Form From Mass Transfer in Binary Systems



*Figure 1: This image of the open star cluster NGC 188 was taken at the WIYN 0.9m in V, B and I. The blue stragglers discussed in this paper are circled. (image credit: K. Garmany, F. Haase NOAO/AURA)*

In a paper published in *Nature* in October, Aaron Geller (Northwestern U.) and Robert Mathieu (U. of Wisconsin) have shown that blue stragglers are most probably formed from mass transfer or mergers in binary systems, rather than originating from stellar collisions as has also been proposed. Observations made at the WIYN 3.5m of the old open cluster NGC 188 show that blue stragglers in long period binaries have companions with masses  $\sim 0.5$  solar mass with very little scatter, which is inconsistent with predictions of the results of stellar collisions.

For more information, see

- Northwestern University Press Release  
<http://www.northwestern.edu/newscenter/stories/2011/10/blue-stragglers.html>

- Nature Article Preview

- <http://www.nature.com/nature/journal/v478/n7369/full/nature10512.html>

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**One Degree Imager Update**  
*Todd Boroson*

The ODI team is now on a path towards installation of the instrument with a partially filled focal plane (pODI) on the 3.5m telescope in the summer of 2012. Over the last year, during a phase of review and replanning, we carried out two major efforts – development and production of a small number of detectors that meet most of the ODI requirements, and revision of the plan to completion. In addition, several smaller (but also important) tasks were completed, such as thermal testing of the dewar, design and fabrication of the last few mechanical parts, and continued work on the instrument software. As a result, the WIYN Board has given its blessing (and funding) for the final testing, integration, and optimization of pODI, and its deployment on the telescope at the conclusion of summer shutdown 2012.

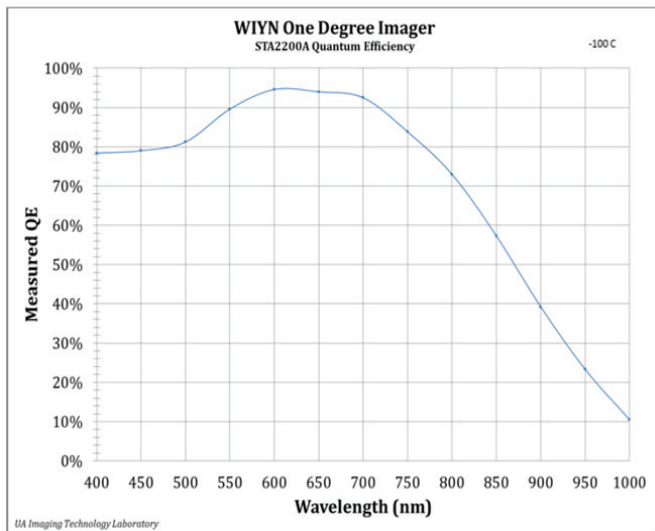
The orthogonal array detectors (OTAs) for ODI are not simple CCDs; they have the ability to rapidly shift accumulated charge during an exposure to compensate for image motion. By making these corrections independently within many separate regions in the focal plane, ODI can produce a one degree wide image with local “tip-tilt” correction. However, the production of large OTAs with good performance characteristics has not been easy. Our

most recent foundry run has yielded 14 OTAs that are close in performance to what we need (64 OTAs are needed to cover the full focal plane). These devices have excellent sensitivity over most of the optical region. See Figure 2.

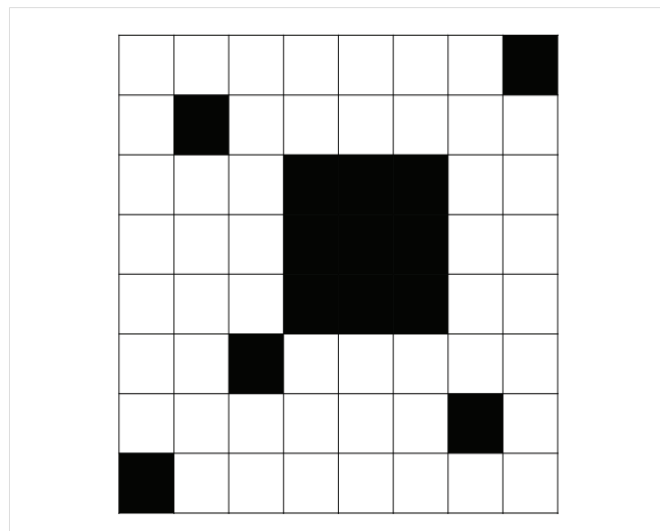
The one significant remaining problem with these OTAs is that they have regions that glow under certain circumstances, including the mode in which we read a section of a device rapidly in order to get guide star information. This will limit the number of guide stars we can monitor at one time, and consequently, it will limit the number of regions into which we can divide the focal plane for shifting. We expect to continue detector development and eliminate these glowing regions in future devices.

The lack of a complete complement of detectors is not impeding our progress, however. We plan to complete the instrument and deploy it initially with a partially filled focal plane. The configuration (see Figure 3) will include a central square filled region about 24 arcminutes on an edge and some outlying detectors. This will allow us to work through the integration and commissioning issues and, in

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**Figure 2: Average measured quantum efficiency for the 14 OTA detectors that will be used in the ODI focal plane in its initial deployment.**



**Figure 3: Configuration of the 14 OTA detectors in the partially-filled focal plane of ODI.**

## One Degree Imager Update

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particular, to measure and understand image quality at all radii within the one degree field of view. A few of the detectors have defective cells (1/64 of an OTA), but we believe that pODI will be a productive scientific instrument. See Figure 4.

At this time the optics of the instrument are being tested, after which the entire instrument will be assembled, including the partial focal plane, for the first time. A series of lab tests will be followed by additional work on optimizing the operation of the detectors. If all goes according to plan, we expect to transport ODI up to the WIYN 3.5m telescope in July 2012, and install it on the telescope. Several weeks of engineering checkout will follow, and then we will begin commissioning. We hope that by early in 2013, this partial-focal-plane ODI, which we have dubbed pODI, is ready for shared risk observing.

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## WHIRC Update

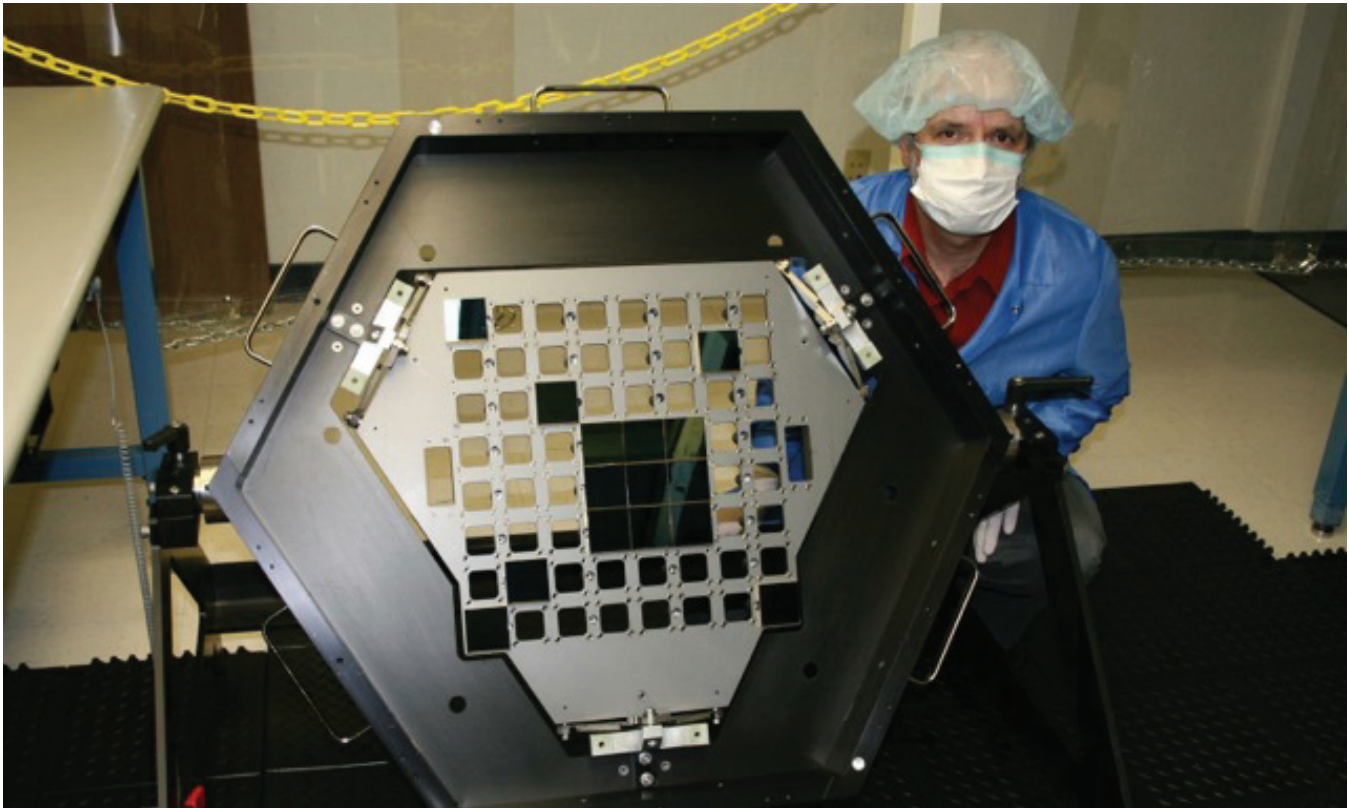
Two new filters have been installed in WHIRC. One replaces the original CO filter, and the second, a CN filter, replaces the red-shifted Paschen-beta filter. These filters were provided by Matt Bershadly at the University of Wisconsin.

Also, please note that as of this writing, WTTM will be continue to be offered in shared-risk mode only. We are currently exploring options to upgrade WTTM and improve its reliability as a tip-tilt imager, but it is unlikely that this work will be completed until late 2012B. Please see <http://www.wiyn.org/observe/status.html> for more details and updates about the filters and WTTM.

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*See more about WHIRC on Page 6.*

**Figure 4: Focal plane for pODI, showing 14 OTAs (plus one nonfunctional device in lower left corner). Number of working pixels will exceed 200 million.**



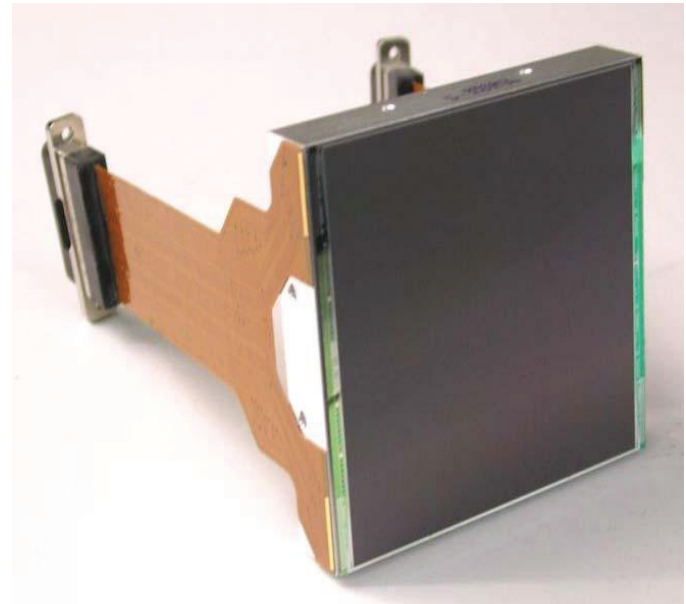
**WIYN 0.9-meter Telescope Report**  
*Hillary Mathis*

While the 0.9m Consortium was sad to see one of its members, The University of Wisconsin at Oshkosh, depart our group, we were able to find other interest to fill that void. The 0.9m consortium would like to welcome its newest member, The Kitt Peak Visitor Center (KPVC), which has officially joined the 0.9m consortium. In the recent past the KPVC has used staggered nights at the 0.9m for their early evening night time program, but those nights have been few and far between for them. We are pleased to be able to assign the KPVC specific nights through the semester to enhance their program and the 0.9m consortium's public outreach. For more information on the 0.9m program please visit the webpage at <http://www.noao.edu/outreach/kpvc/wiyn-public.php>.

Our current membership now includes 9 partners. Along with the Kitt Peak Visitor Center, our members include Indiana University, University of Wisconsin at Madison, Stevens Point and Whitewater, The Wisconsin Space Grant Consortium, San Francisco State University, Austin Peay State University and Rochester Institute of Technology. Please visit our website at [www.noao.edu/0.9m](http://www.noao.edu/0.9m) for more information about our members and the telescope.

The WIYN 0.9m is proud to announce that we are a couple steps closer to acquiring a turnkey operated instrument that has been named HDI, or the Half Degree

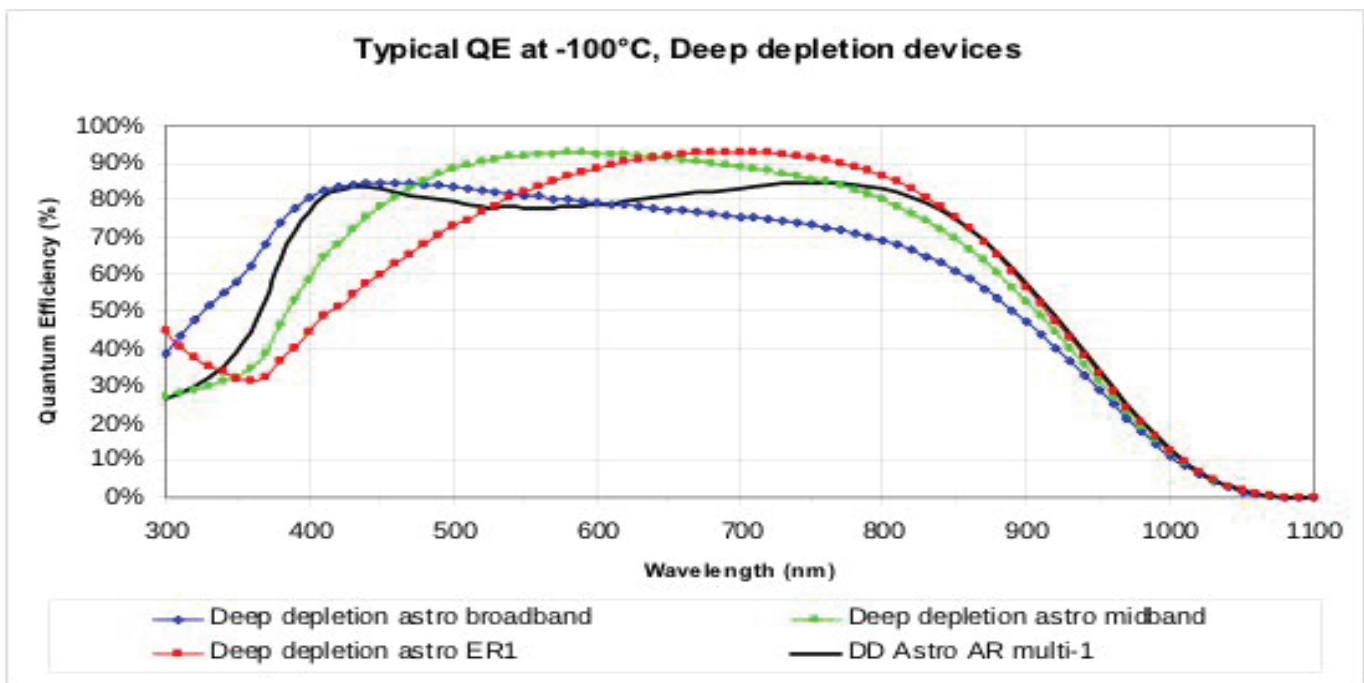
*Figure 6: the QE curve for the chip.*



*Figure 5: the CCD231-84 chip purchased from E2V. Imager. In May, a CCD231-84 chip (see Figure 5) was purchased from E2V. The chip is a 4Kx4K monolithic CCD with 4 amplifiers, but can be read out through 1, 2, or 4 of the output circuits. It is a backside-thinned deep depletion chip coated with an astro broadband coating. Please see Figure 6 of the chart for the QE curve of the chip. Its pixel size is 15 microns square, and the read noise is 5e<sup>-</sup> at 1MHz and 2e<sup>-</sup> at 50kHz.*

The other part of moving forward is the signing of a contract with our vendor. We anticipate signing the contract in early 2012. If all goes well the 0.9m consortium and HDI should be ready for commissioning during the 2012B semester.

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## Director's News

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Given the amount of time since the last issue, now let me spend a little time highlighting a few things that have changed. First, as I assume most of you are aware, the One Degree Imager (ODI) project underwent a re-evaluation during the first 9 months of 2011. This effort was led by Dr. Todd Boroson of NOAO. This re-evaluation resulted in a restructuring of the project to first deploy and commission ODI and its associated data system (the ODI Pipeline, Portal, and Archive system, aka ODI-PPA) with a partially populated focal plane (pODI, and pODI-PPA). An external review panel endorsed the plan in October 2011, and since then things have been ramping up fast! The pODI-PPA system will be undergoing a Critical Design Review February 28 – 29, 2012, and pODI is scheduled to arrive at the telescope in July 2012. (See the article in this issue for more details.) We're all anticipating this long-awaited moment!

Second, the WIYN dome was damaged during an unusually strong storm in January 2010. Dome panels were lost, and some of the structural integrity of the dome was compromised. In 2011, a study was conducted by an external company, incorporating information provided by staff at KPNO and WIYN, to recommend options for repair or replacement of the dome. At WIYN's request, these options included recommendations to address the areas of the dome that leak – a long-standing issue. A proposed solution has been developed, and we are currently undergoing the detailed planning for the repair work, which will begin in early 2012. Part of this work will require shutting down science operations for an extended period of time (up to six weeks) in 2012A. The combination of the preparation work for pODI and the dome repair work has led to limited science time for 2012A, and commissioning of pODI will also impact access to science time in 2012B. By early 2013A, though, WIYN will be a stronger and safer facility that is operating a new, forefront scientific instrument and data system – our paradigm of observing at WIYN is about to change!

A third thing to highlight is the change in WIYN governance. In December 2011, the WIYN Board voted to adopt a new governance model. This model consists of three major components, the WIYN Board (for the moment as currently constituted, i.e. three members per partner), a new WIYN Science Steering Committee (SSC, with two scientific members per partner; this replaces the former Science Advisory Committee [SAC], which had one member per partner); and an Executive Director. Main goals of this restructuring are to increase the involvement of the partner scientists in the scientific planning for WIYN, and to allow the Board to focus on administrative matters and overseeing the planning for WIYN's future. Interim Chair of the SSC is Dr. Bob Mathieu of Wisconsin. The Board plans to officially appoint a Chair at the upcoming face-to-face Board meeting in Tucson on February 14 – 15, 2012. The SSC will be meeting monthly, and I encourage you all to contact your local SSC representatives to get the latest and greatest information.

Finally, as always happens with time, there have been changes in the personnel who support WIYN. Some have gone on to focus entirely on new opportunities, including former WIYN Director Pierre Martin, former ODI programmer John Ivens, former Administrative Coordinator Sheryl Falgout, former ODI Project Manager John Cavin, former ODI Systems Engineer Rick McCloskey, former Operator Associate (OA) George Will, and former KPNO Director Buell Januzzi. I'd like to take this opportunity to thank all of them for their key contributions to WIYN, and wish them well in their future endeavors. Other people have moved on to be primarily involved in other activities, but are still actively engaged in WIYN and/or ODI, including former Interim KPNO Director Abi Saha, former WIYN Site Engineer Charles Corson, former ODI Mechanical Engineer Gary Muller, and former Board President Charles Bailyn. I'd also like to extend my appreciation to them, not only for what they

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have already contributed, but for their continued contributions as well!

And while there have been departures, there have also been arrivals! Dr. John Salzer of Indiana University became the new WIYN Board President in September 2011. Dr. Todd Boroson was officially appointed the Principal Investigator of the entire ODI and ODI-PPA system. Mark Hunten from NOAO has joined the ODI team as the Systems Engineer. Dr. Jayadev Rajagopal has joined the KPNO scientific staff and serves both as the WIYN Telescope Scientist and the WIYN Imager Scientist. Dr. Tim Beers became Director of KPNO in October 2011, and Dr. Lori Allen has assumed the role of KPNO Deputy Director. Dan Eklund of KPNO is providing support overseeing the planning and monitoring of WIYN's finances. Nanette Bird and Cheri Marks of KPNO and Melissa Bowersock of LSST are providing invaluable assistance helping make sure all the myriad of details needed to run our facility are taken care of.

On a last note, I want to take a moment to thank those folks who now report to me, and were involved in WIYN and/or ODI before the ODI re-evaluation period started. They have been key to the continued success of WIYN day-to-day operations and support of ODI: Dr. Daniel Harbeck, ODI Scientist; Heidi Schweiker, WIYN Operations Manager; Hillary Mathis, 0.9m Site Manager; and Andrey Yeatts, ODI Software Architect. We couldn't have done it without you!

~Pat Knezek

## WHIRC Does Daily Duty to Capture SN2011fe Light Curve

Lori Allen and Dick Joyce (NOAO)

When news of the nature of the transient PTF11kly emerged in late August, WIYN and NOAO scientific staff realized we had a great opportunity to track the light curve of this nearby Type Ia supernova. With WHIRC installed on the WTTM port of WIYN, it could be available every night for observations, without impeding the classical observers instrumentation choice. Thus began a two-month long campaign to monitor SN2011fe in the near infrared. The resultant light curves in J, H, and Ks are shown here (Figure 7), in a plot with arbitrarily scaled magnitudes (a properly scaled plot will appear in an upcoming paper).

More than thirty WIYN observers contributed to this effort, either by turning the telescope over to us for the first half hour of the night so we could make the observations, or by observing the SN themselves. Their cooperation was essential to the success of this program.

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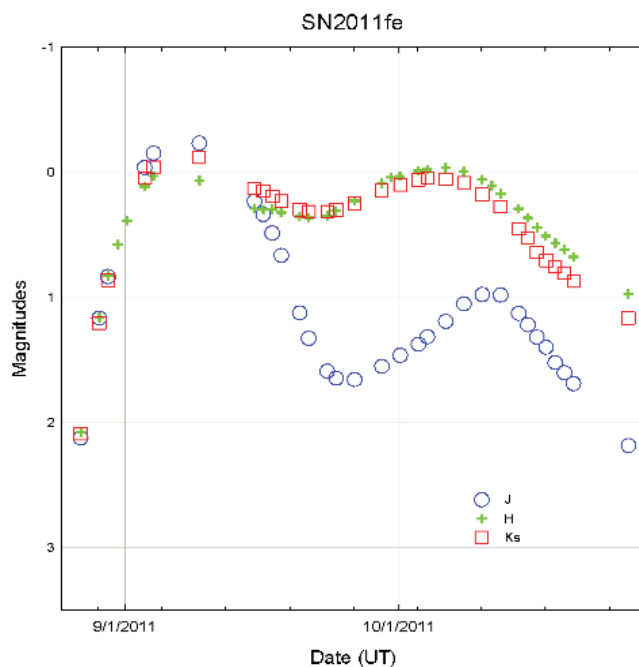


Figure 7. Light curves in J, H, and Ks.

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