BVRI Photometry of SN 2013ej in M74 from RIT Observatory

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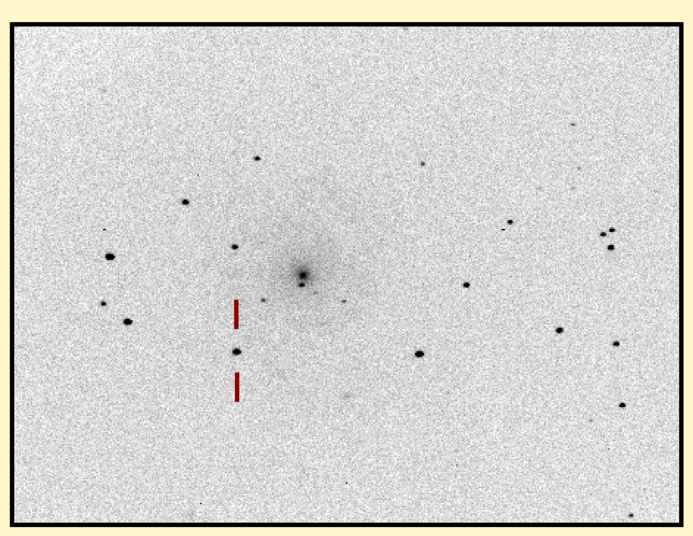
Image by Bart Delsaert, in Montlaux, France, Sep 4+7, 2013 (not used in this study).

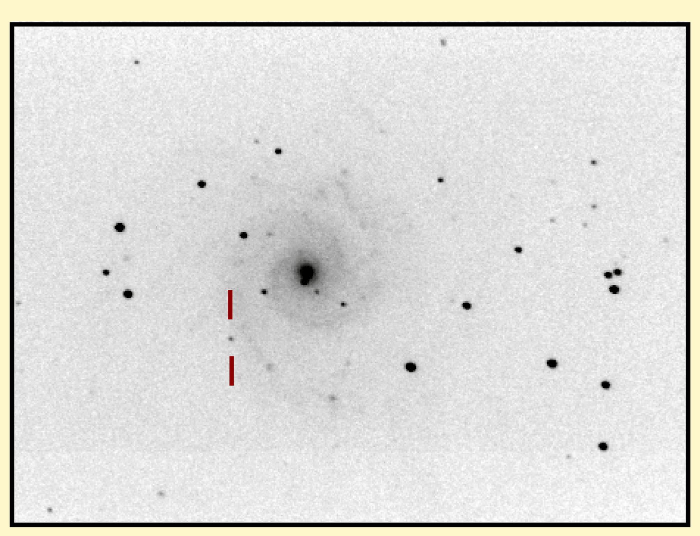
On UT July 25.45, the Lick Observatory Supernova Search team acquired an image showing a new object in the nearby galaxy M74. Rumors of the possible SN spread the next day, and I began monitoring the SN starting on July 27.20, using the RIT Observatory's 12-inch Meade LX200 and SBIG ST-8E CCD camera. The AAVSO has provided accurate magnitudes for five nearby stars (circled in image to left), allowing one to calibrate measurements of the SN onto the standard Johnson-Cousins scale.

Spectra show that this is a Type II-P supernova (Valenti et al., arXiv 1309.4269), due to core-collapse within an M supergiant of initial mass 8-15 solar (Fraser et al., arXiv 1309.4268). The RIT light curves show a long plateau phase as the recombination front works its way through the massive hydrogen envelope of the exploded star. About 80 days after maximum light, the plateau ends and the luminosity drops sharply. After a brief, sharp drop of about 2 magnitudes, the light curves flatten again, as an exponential decline powered by radioactive decay of iron-group elements begins.

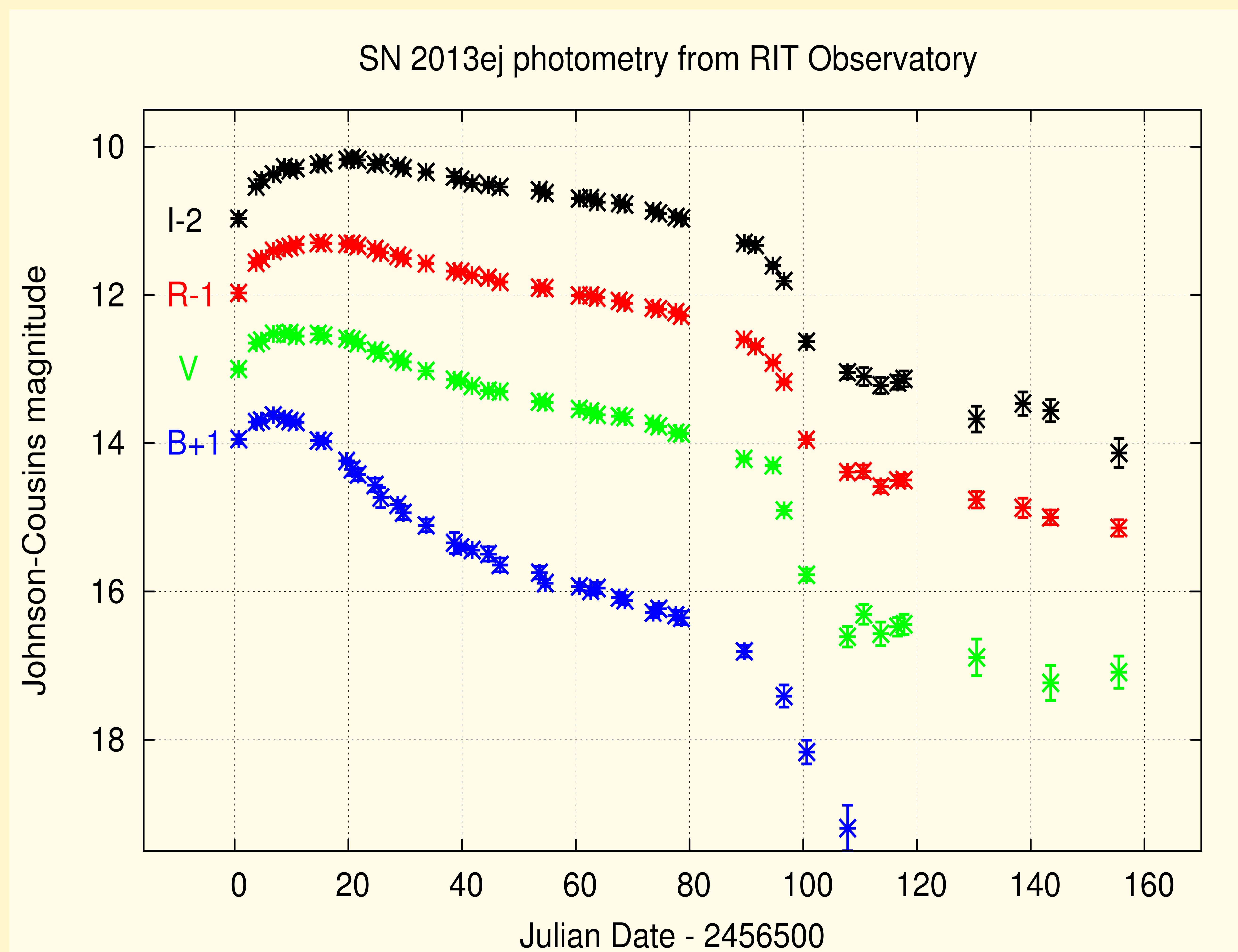
Below are sample images from RIT Observatory, which WERE used in this study.



Aug 2: 1 x 30 sec, R-band



Dec 28: 23 x 30 sec, R-band



Fitting low-order polynomials to each light curve near the peak yields the following dates and magnitudes:

Passband	JD – 2,456,500	Mag
B	7.4 ± 0.4	12.65 ± 0.01
V	12.2 ± 0.6	12.51 ± 0.01
R	16.4 ± 0.4	12.30 ± 0.01
I	20.6 ± 0.5	12.19 ± 0.01

For more details on the data reduction and analysis, and to grab a copy of the photometric measurements, scan the QR