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Light echoes of SNe in the LMC

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Abstract. The SuperMACHO project has discovered light echoes from 3 ancient SNe in the LMC. These SNRs are three of the six youngest in the LMC, and are classified as likely SN Ia based on X-ray data.

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In recent years, light echoes have been discovered around some nearby extragalactic supernovae well after the explosion, most notably the light echoes from SN 1987A (Crotts 1988). However, to date no light echoes of historical SNe of Galactic or extragalactic origin have been discovered. In the SuperMACHO project, we have imaged the bar of the LMC repeatedly and used an automated pipeline to subtract point-spread-function matched template images from the recent epoch images. The resulting difference images are remarkably clean of the constant (in time) stellar background and are ideal for searching for variable objects. Using these difference images, we have mapped the extensive light echo complex around SN 1987A further out, and deeper, than has been previously possible. Besides the SN 1987A light echoes, we found three other groups of light echoes associated with known supernova remnants (SNRs). These SNRs are three of the six youngest in the LMC, and are classified as likely SN Ia based on X-ray data (Hughes *et al.* 1995). By combining the position and apparent proper motions of the light echoes, we derive ages for the SNRs (Rest *et al.* 2005). Spectra of the light echoes taken with the GMOS spectrograph on the Gemini South telescope suggests that the explosion causing one of the SNRs was an overluminous Type Ia supernova explosion.

References

Crotts, A. 1988, *IAUC* 4561
Hughes, J. P., Hayashi, I., Helfand, D., *et al.* 1995, *ApJ* (Letters), 444, L81
Rest, A., Suntzeff, N. B., Olsen, K., & SuperMACHO collaboration 2005, *Nature*, 438, 1132