Searching for Young Type Ia Supernova Remnants in M83

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- **What** – M83 (NGC 5236), at a distance of 4.61 Mpc, is a nearby large grand-design spiral galaxy.

- **Why** – SNRs have been identified by high [S II]/Hα ratios or O-rich SN ejecta (Dopita et al. 2010; Blair et al. 2012; Long et al. 2014; Blair et al. 2014). However, young Balmer-dominated Type Ia SNRs have escaped detection because of their lack of forbidden lines.

- **How** – Adopting the characteristics of Type Ia SNRs in the Large Magellanic Cloud (LMC) reported by Ou et al. (poster at this meeting).

  (1) Balmer-dominated optical spectra,

  (2) well-defined shell structure,

  (3) X-ray luminosities of a few $\times 10^{36}$ erg/s, and

  (4) Pop II stellar and interstellar environments.
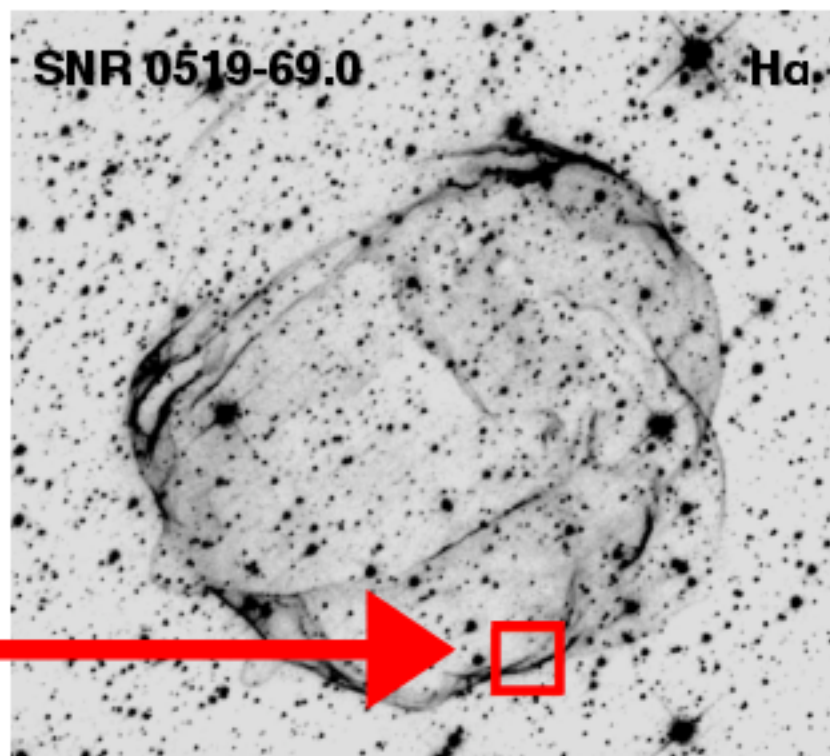
Are our candidates viable?

- We scale their LMC counterparts and estimate their expected surface brightness in M83.
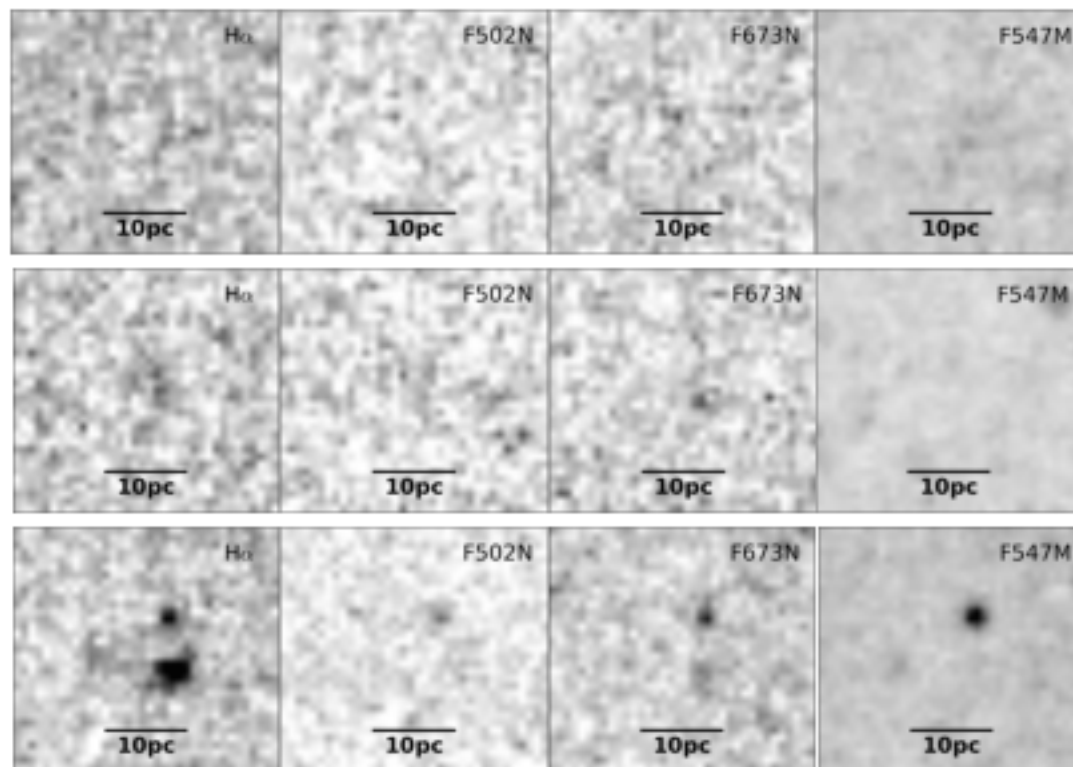

M83
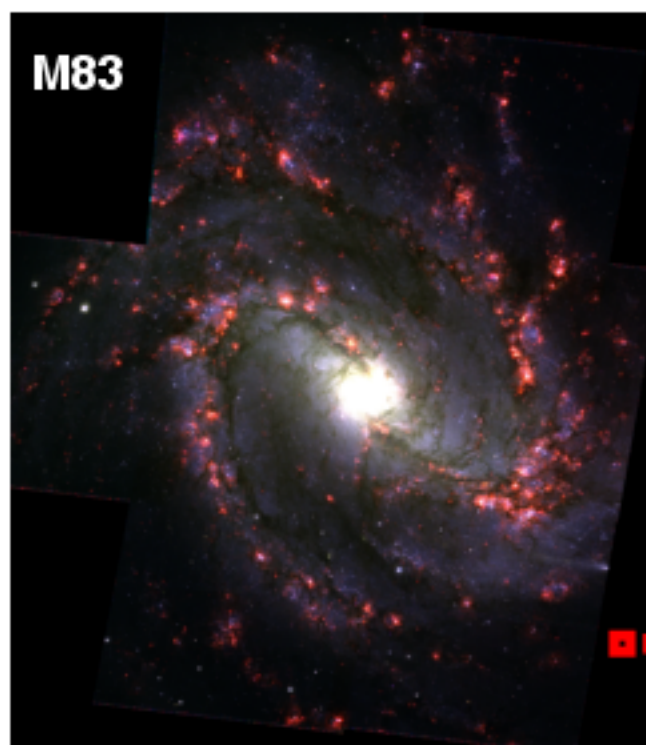
4.61 Mpc   **WFC3, 1x1 pixel**

SNR 0519-69.0   Hα

50 kpc   **ACS, 73x73 pixels**

A Balmer-dominated Type Ia SNR in M83 is expected to be detected at generally ~2-3σ level and up to ~5σ level for the brightest filaments.

Results

We suggest that the three objects are promising candidates for Balmer-dominated Type Ia SNRs in M83.

Images of 3 Type Ia SNR candidates (from left to right) showing Hα (F657N), [O III] (F502N), [S II] (F673N), and stellar continuum (F547M).