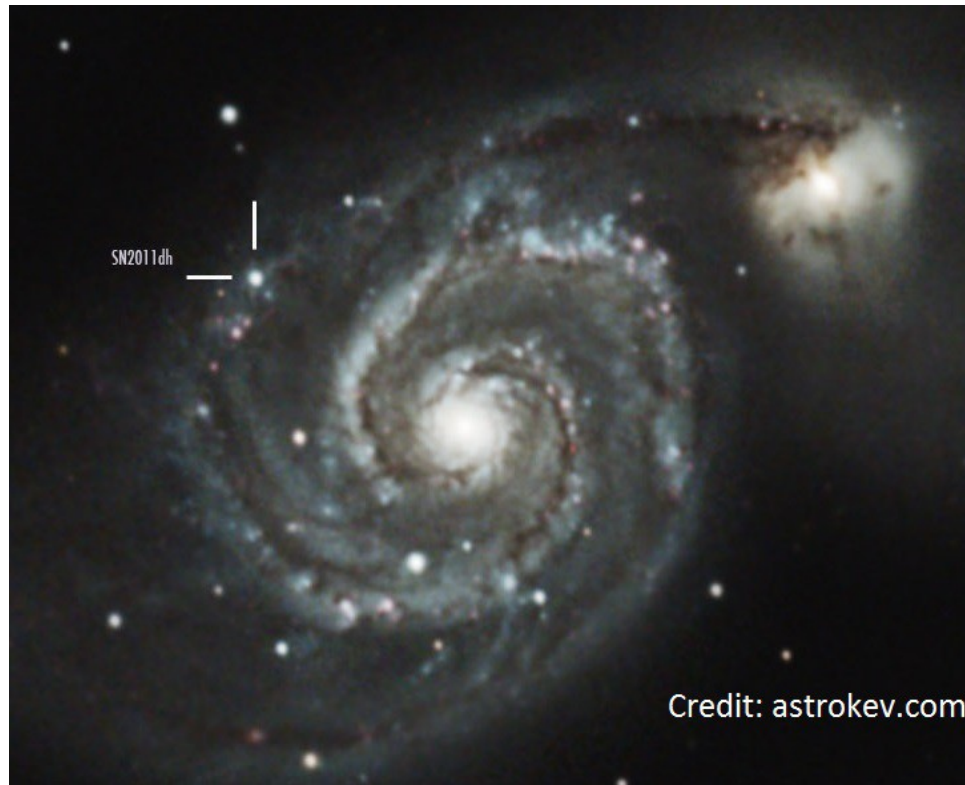


# Progenitor and host galaxy properties through CCSN spatial distributions



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2014

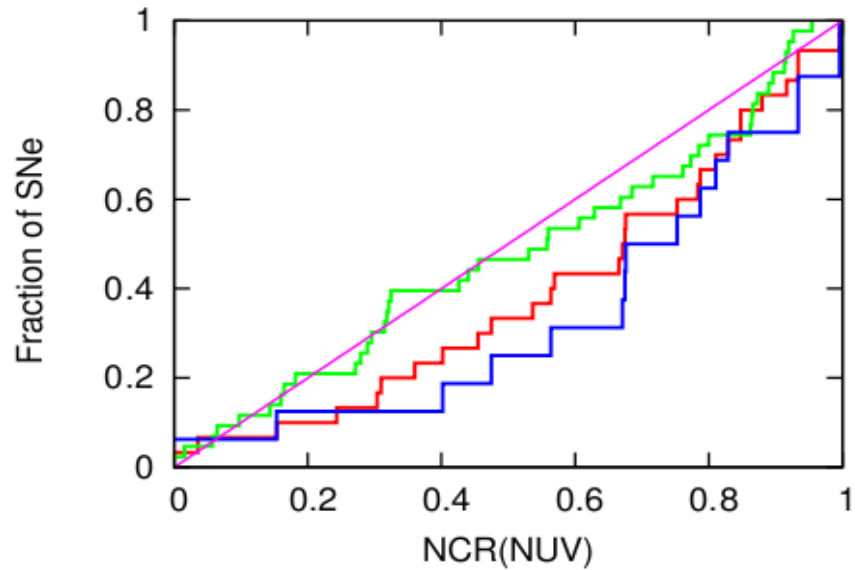
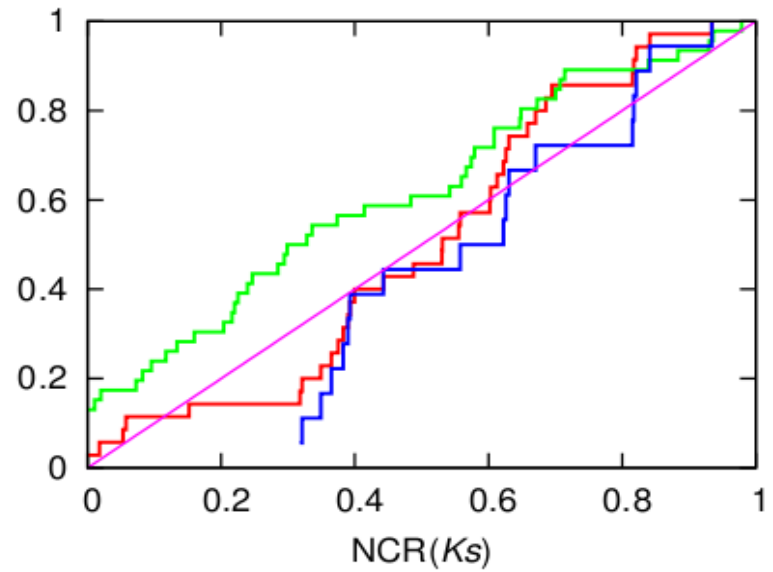
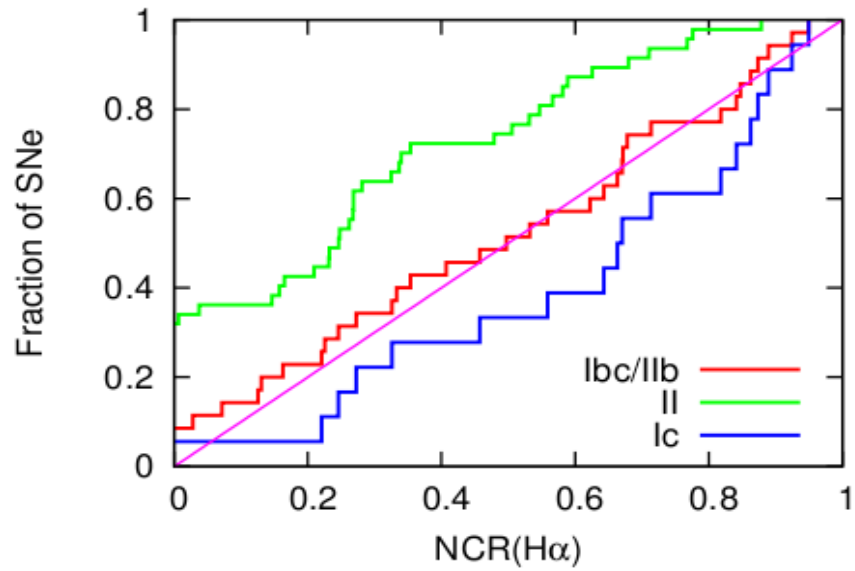
# Introduction

- Spatial distributions: an indirect (statistical) tool for CCSN progenitor studies
- Indirect studies of CCSNe in (normal) spiral galaxies: e.g. Anderson+ 2012, Habergham+ 2012, Hakobyan+ 2009
  - This project: starbursts/strongly star-forming galaxies

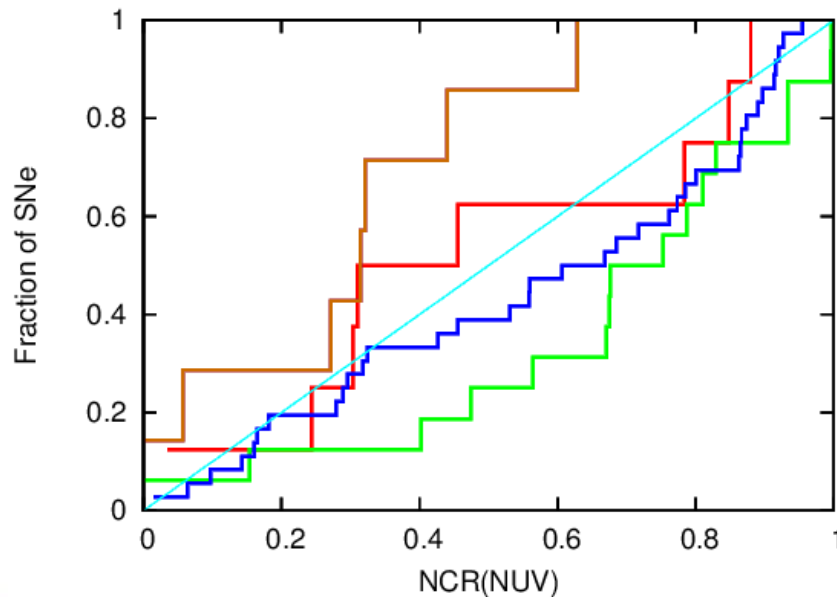
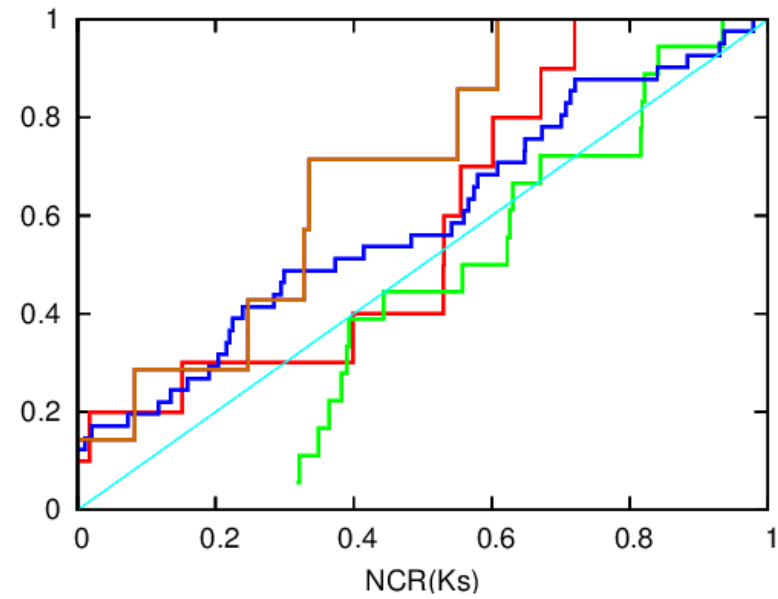
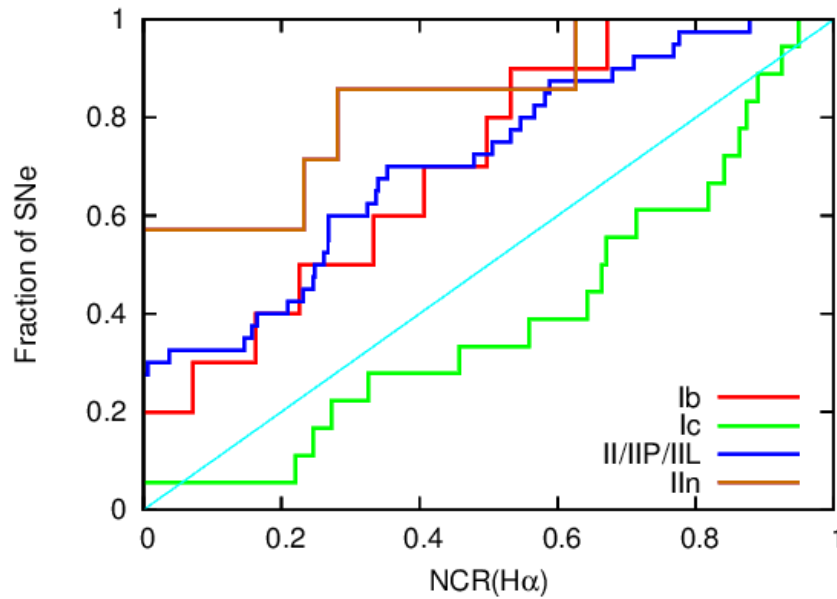
# Sample and methods

- 57 galaxies (many starbursts, 10 LIRGs) with 86 CCSNe in them after 1990
  - 35 stripped-envelope, 47 type II, 4 unknown
- Pixel statistics: correlation between SN locations and brightest areas of galaxies
  - GAIA → discoveries with precise coordinates
- Radial distributions of SN surface density
  - GAIA → SNe closer to nuclear regions

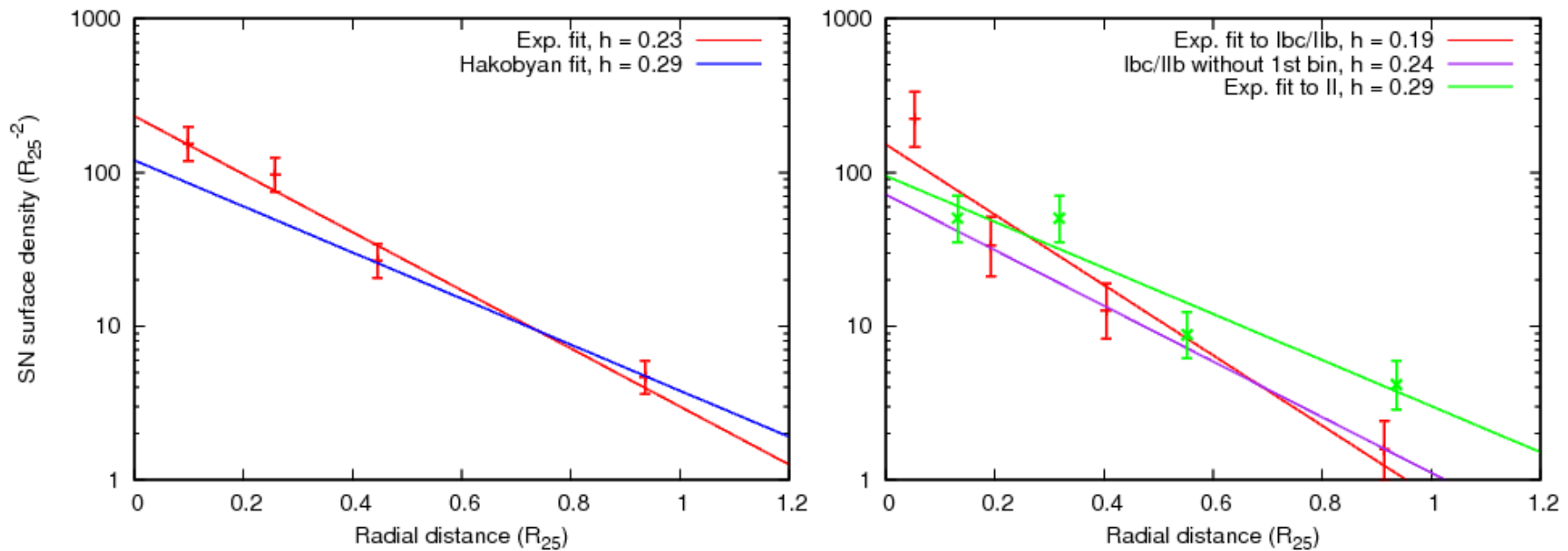
# Results



# Results



- Types II and Ib similar  $\rightarrow$  binarity important?
- IIn?
- Ic different from Anderson+ 2012

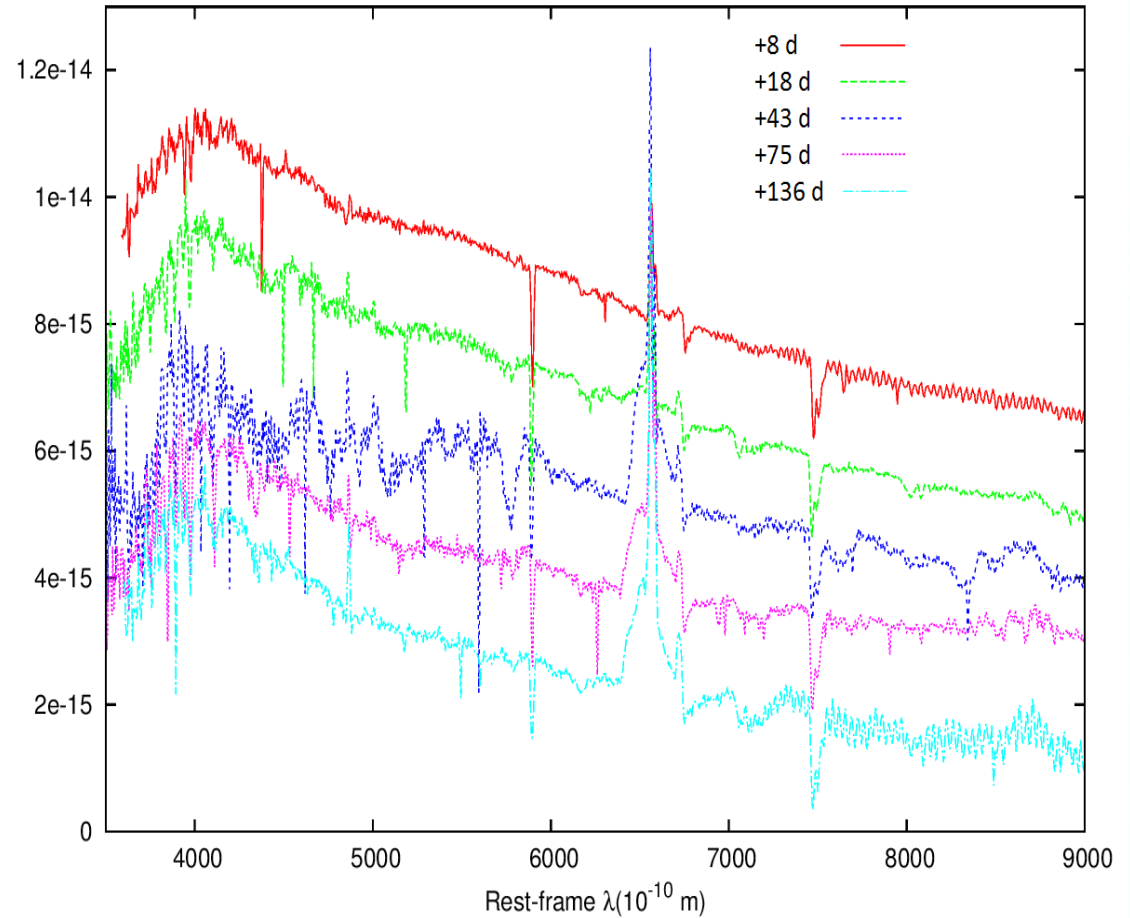


- Central excess of Ibc SNe compared to both type II and to normal galaxies (normals: Hakobyan+ 2009)
  - Habergham+ 2012: stronger excess in “disturbed” galaxies
- Explanations: metallicity effect? Modified IMF? Favored: enhanced close binary fraction

# More to come...

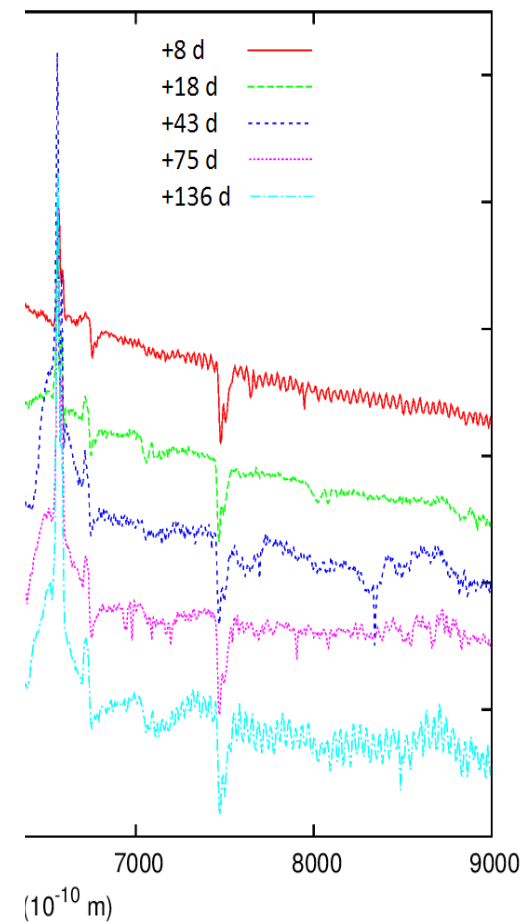
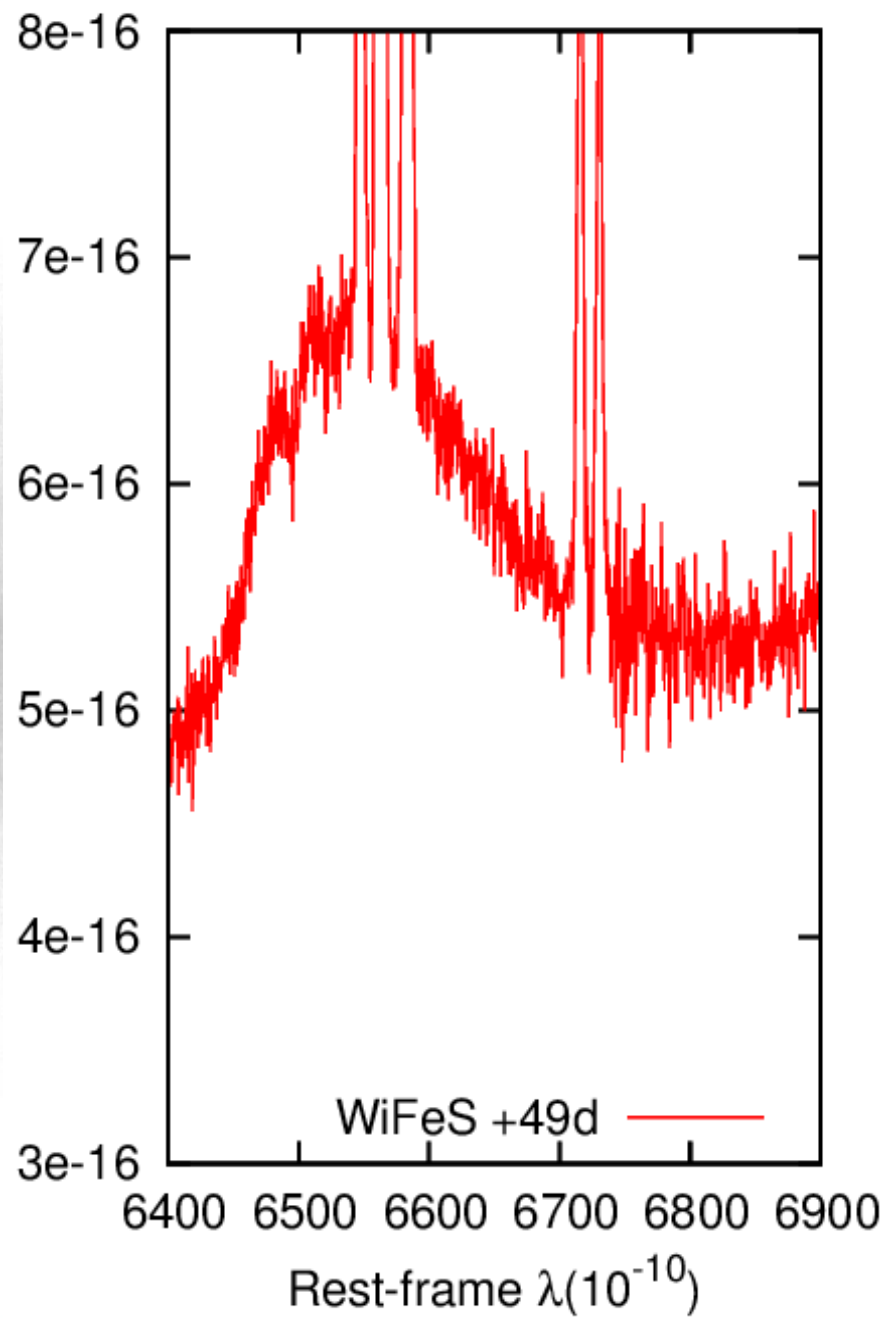
- On-going: large sample of normal host galaxies in Ks and NUV
- Ibc central excess stronger in merger/close-pair systems → on-going: more such systems in  $H\alpha$ , NUV

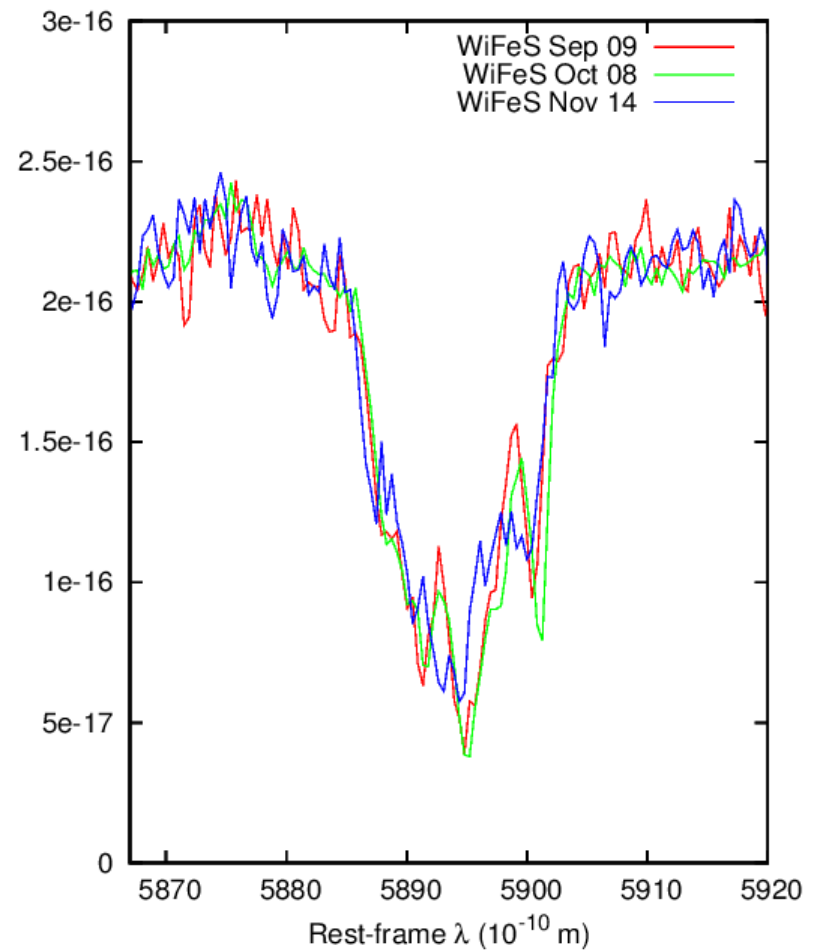
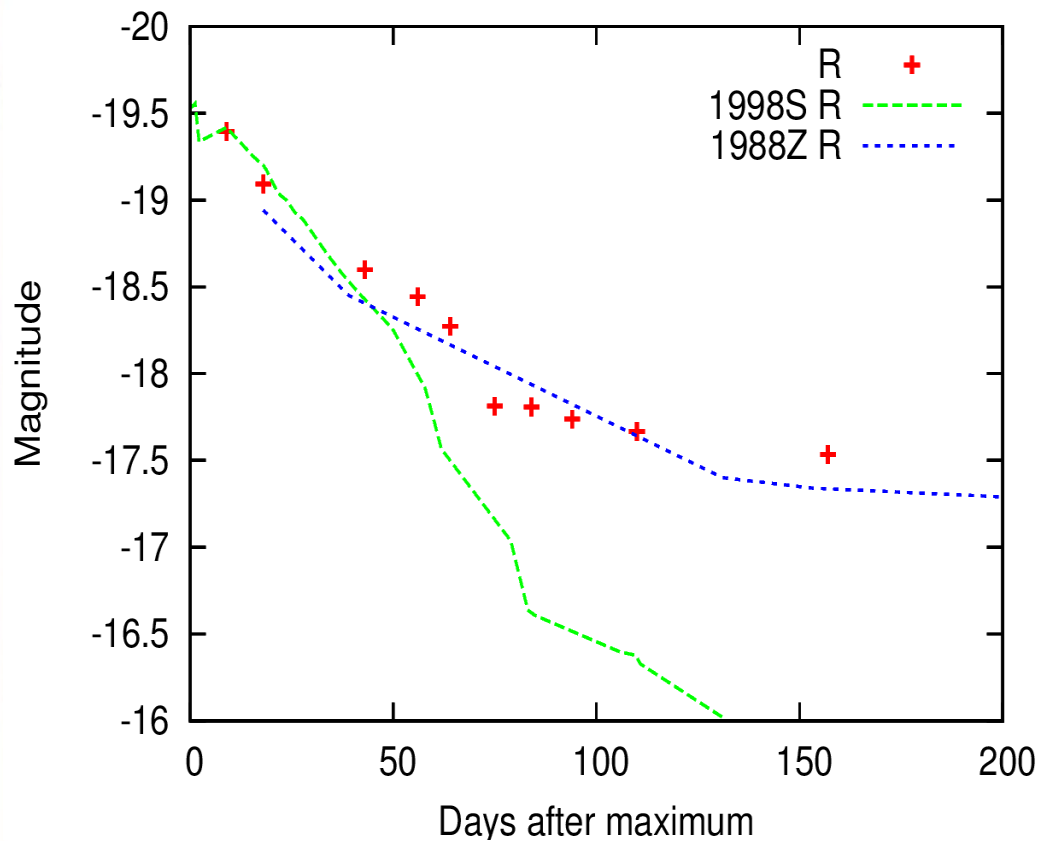
# ...and then something else: SN 2013fc



PESSTO follow-up of IIn SN 3.5" from the core of ESO 154-G10







Spectrum  $\rightarrow$  1998S-like?

Prelim. light curve  $\rightarrow$  1988Z-like?

Na I D equivalent width 9  $\text{\AA}$ !  $\rightarrow A_V \sim 4$  or  $\sim 6$

# Summary

- Similar NCRs in normal spiral and starburst hosts
  - Ib vs II: similar progenitor masses. Other things (Podsiadlowski+ 1992; Eldridge+ 2013 → binarity) dominant?
- Central excess of Ibc compared to II AND compared to the Ibc of normal galaxies
  - Dominant driving factor: enhanced central close binary fraction?
- SN 2013fc: interacting SN close to core; abnormal Na I D
  - WIP; templates needed for photometry and spectroscopy