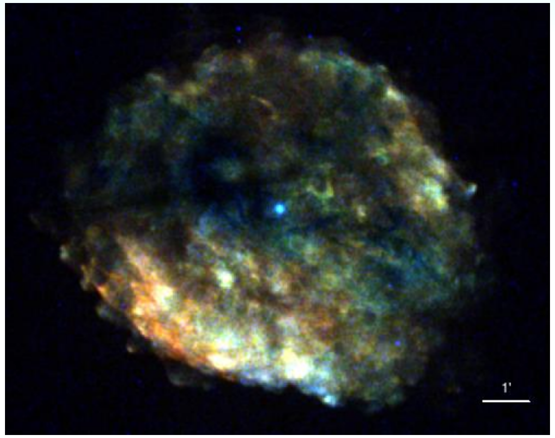
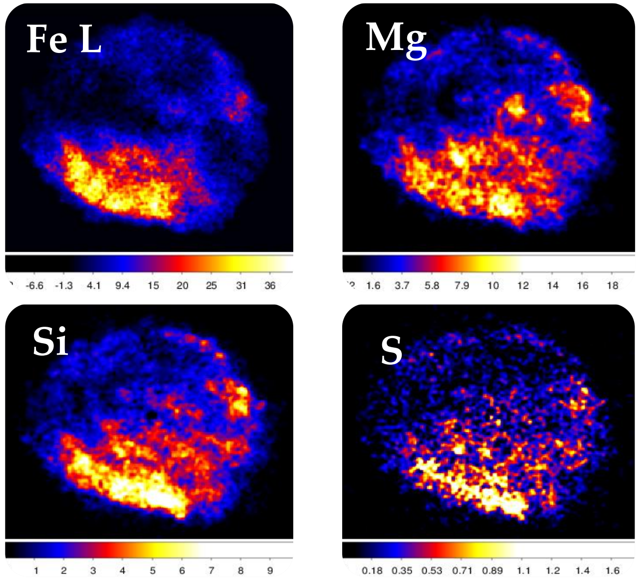
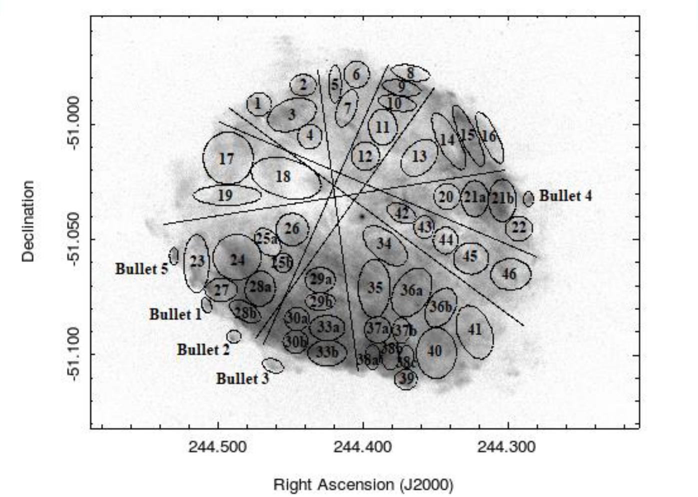
An Imaging and Spectroscopic Study of RCW 103

Authors: C. Braun, S. Safi-Harb, C. Fryer





Full SNR fit: VPSHOCK+APEC	
n_H ($\times10^{22}$ cm^{-2})	1.05
Hard VPSHOCK	
kT (keV)	0.56
Mg	1.3
Si	1.4
S	1.0
Fe = Ni	1.2
$n_e t$ ($\times10^{11}$ cm^{-3} s)	6.1
Soft APEC	
kT (keV)	0.19



Main Results

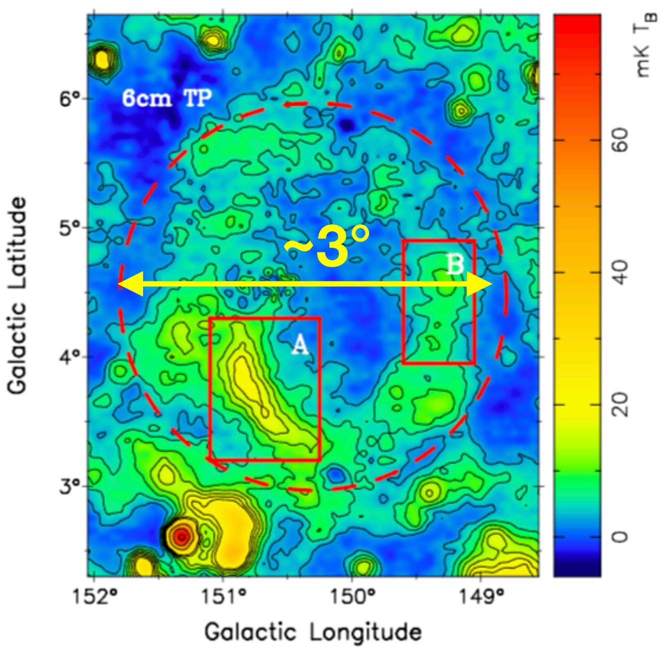
Age ($D_{3.1}$ kyr)	0.88−4.4
E_* ($f_s^{-1/2} D_{3.1}^{5/2}$ erg)	3.7×10^{49} ($< 2\times10^{50}$)
Progenitor Mass ($M_\odot$)	12−13

Fermi-LAT observations of the surprising SNR G150.3+4.5

J. Devin, M.-H. Grondin, J. Hewitt, M. Lemoine-Goumard (on behalf of the Fermi-LAT collaboration)

Radio data

Old or a nearby SNR?



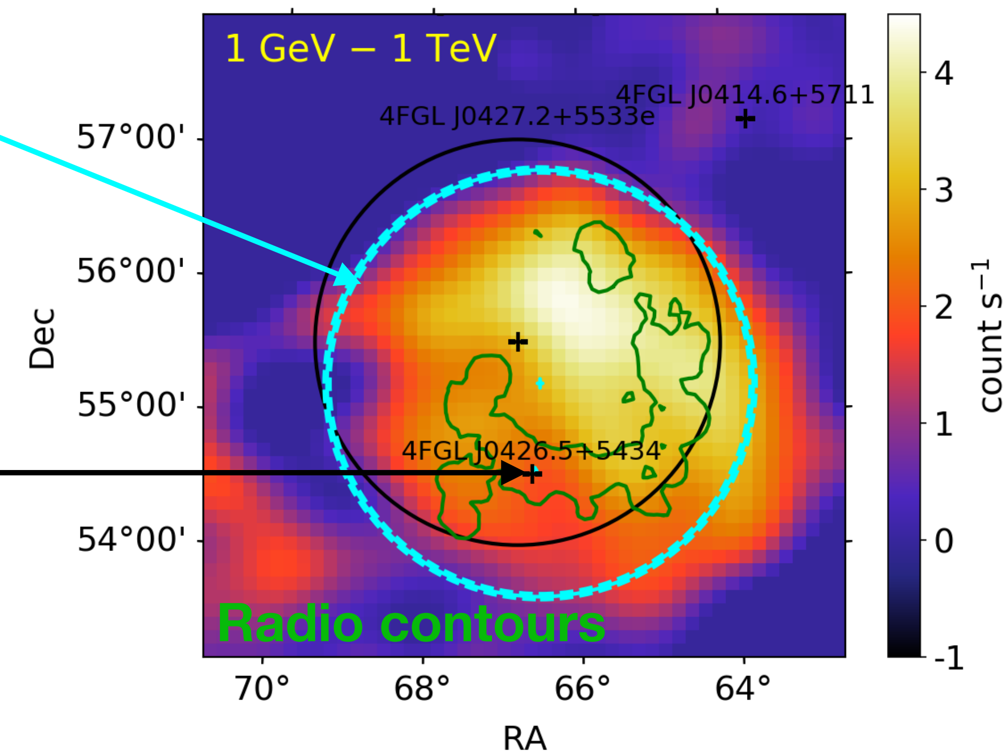
Gamma-ray morphology (1 GeV — 1 TeV)

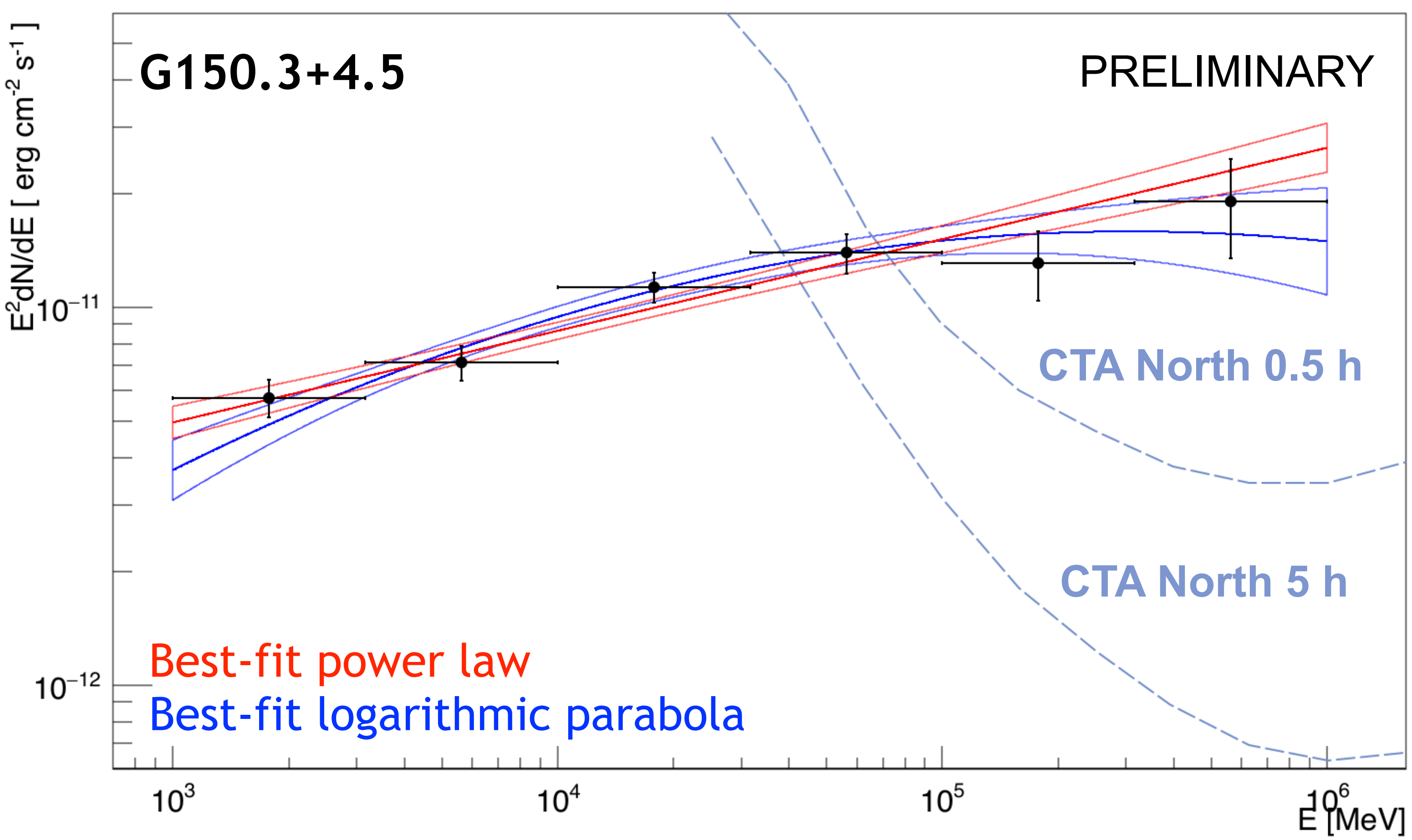
- G150.3+4.5: best-fit disk

$$r = 1.593° \pm 0.022°$$

- 4FGL J0426.5+5434 is not extended and has a pulsar-like spectrum in the catalog

Emission from G150.3+4.5:





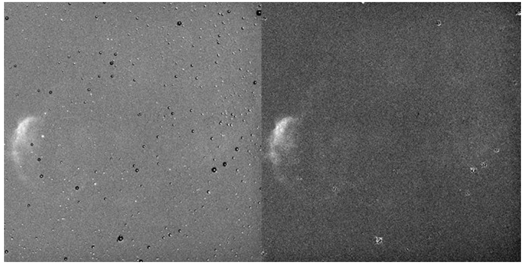
$$\Gamma = 1.76 \pm 0.03$$

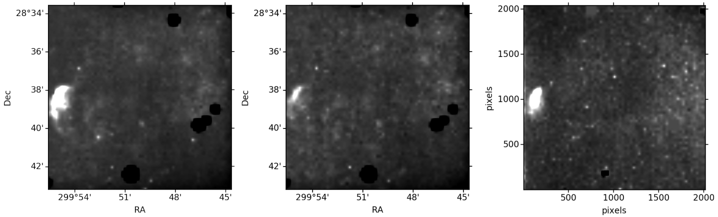
- Hard spectrum favors the young SNR scenario
- Acceleration of particles up to TeV energies

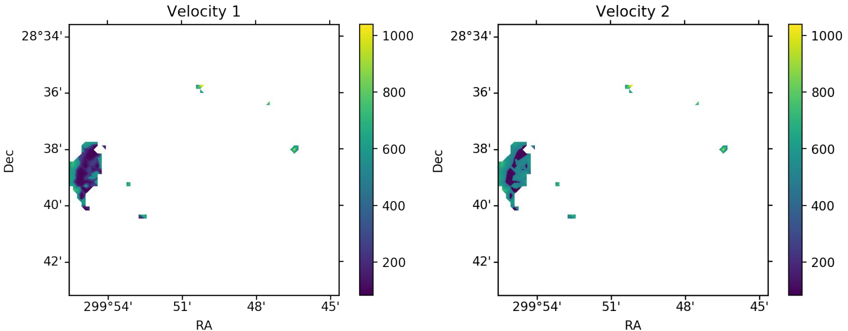
Mapping the Physical Properties of Supernova Remnants in our Galaxy

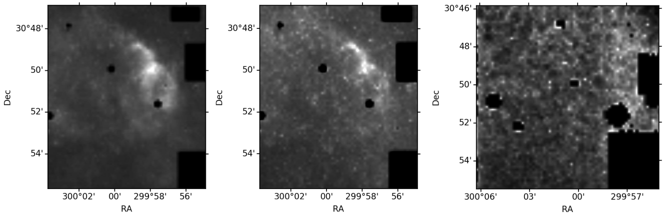
John A. Kypriotakis*, Andreas Zezas, Ioanna Leonidaki
University of Crete, Greece / FORTH-IESL, Greece *ikypriot@physics.uoc.gr

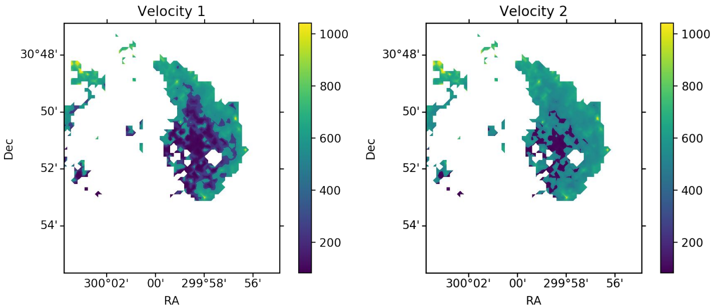
Remnant	Filter	AB Magnitude
G65.8-0.5	H_{α}+[N_{II}]	10.868±0.075
	[S_{II}]	11.10±0.11
	[O_{III}]	12.36±0.20
G67.8+0.5	H_{α}+[N_{II}]	10.015±0.021
	[S_{II}]	10.469±0.055
	[O_{III}]	11.124±0.086







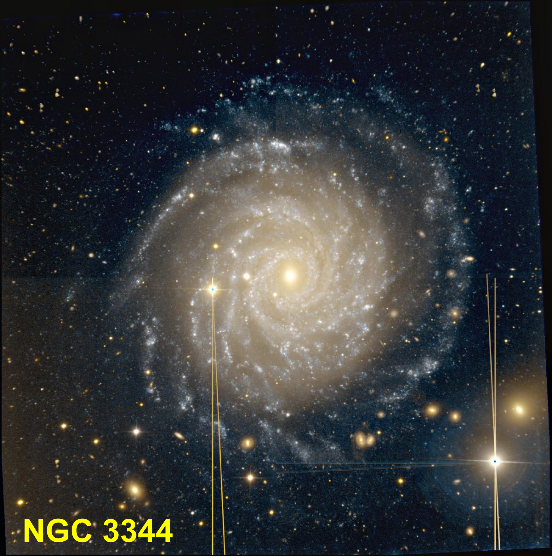




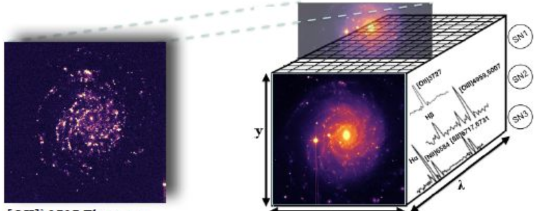
3D Optical Spectroscopic Study of NGC 3344 with SITELLE: I. Identification and Confirmation of Supernova Remnants

I. Moumen[1,2], C. Robert[1], D. Devost[2], R.P. Martin[3], L. Rousseau-Nepton[2,3], L. Drissen[1], T. Martin[1] and P. Amram[4]

1 Université Laval, Québec (QC), Canada | 2 Canada-France-Hawaii Telescope, Waimea (HI), USA | 3 University of Hawaii at Hilo, Hilo (HI), USA
4 Laboratoire d'Astrophysique de Marseille, Marseille, France



1. Observation

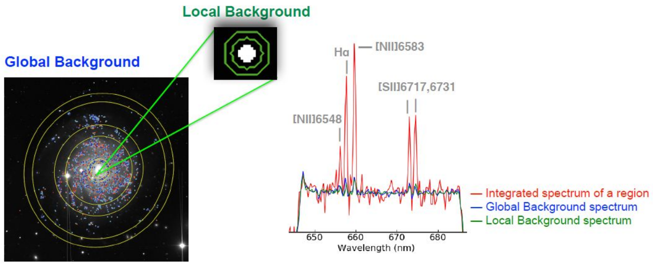


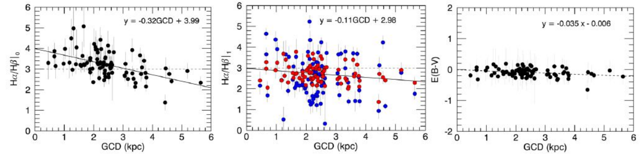
[OII]λ3727 Flux map

A 3D SITELLE Spectral datacube

4 million spectra in each datacube (350 nm - 900 nm)

2. Background subtraction

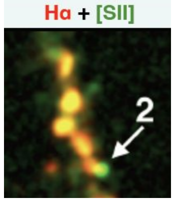




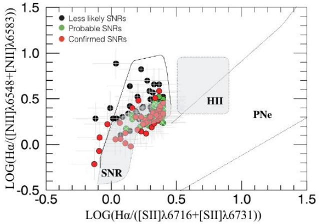
Global background vs Local background

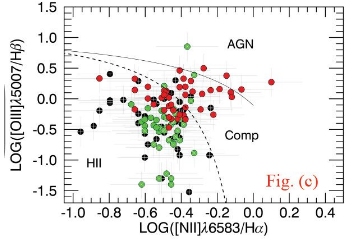
3. Automatic identification

1. Line ratio [SII]/Hα ≥ 0.4
2. S/N ≥ 5 for Hα and [SII]
3. The size ≤ 120 pc;
4. The correlation coeff ≥ 0.5



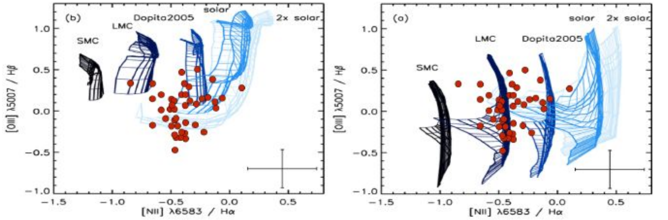
4. Confirmation





42 Confirmed SNRs, 45 Probable SNRs, and 42 Less likely SNRs

5. Shocks



A metallicity ranging between LMC and 2solar

Low shock velocity below 250 km/s

Structures of M33 Supernova Remnants Revealed by Broad-Band HST Images

Po-Sheng Ou （歐柏昇）, You-Hua Chu （朱有花）, Chris Lin （林鼎鈞）

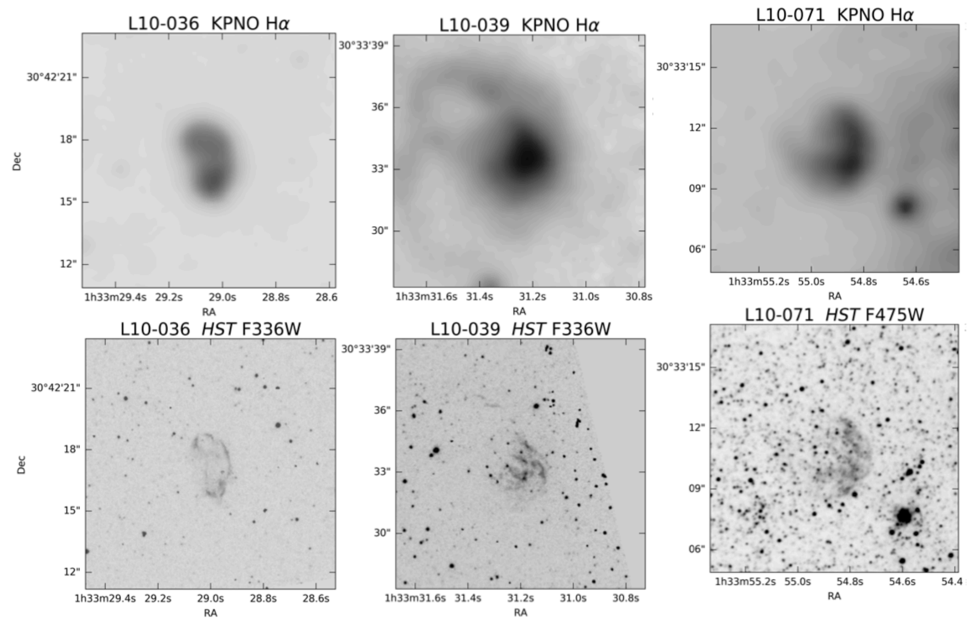
Catalog of 218 SNR candidates in M33
Long et al. (2010); Lee & Lee (2014)

***HST* archival data**
From the Legacy Imaging Survey of M33 (PI: Dalcanton)
Only broad-band images!

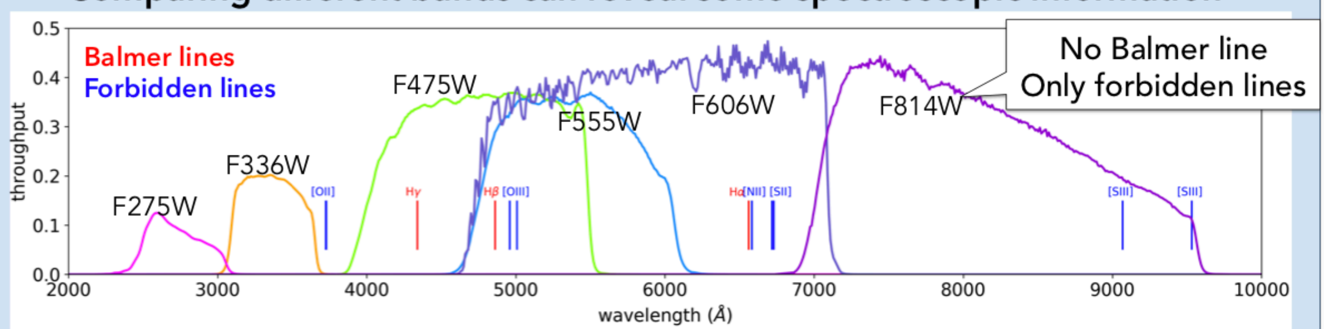
80 SNRs imaged in *HST* broad bands
6 SNRs detected

	Surface Brightness (erg/s/cm²/arcsec²) *Long et al. (2010)*	**Diameter** (pc) *Long et al. (2018)*	**Density** (cm^{-3})	**X-ray Luminosity** (erg/s) *Garofali et al. (2017)*
L10-036	5.0×10^{-15}	22	>11	4.1×10^{36}
L10-039	1.5×10^{-14}	16	>22	6.4×10^{36}
L10-045	5.8×10^{-15}	33	>10	1.8×10^{36}
L10-071	5.0×10^{-15}	24	>10	5.4×10^{36}
L10-096	3.7×10^{-15}	22	>9	3.0×10^{36}
L10-124	9.4×10^{-15}	14	>19	1.1×10^{35}

X-ray bright SNRs in dense environments



Comparing different bands can reveal some spectroscopic information

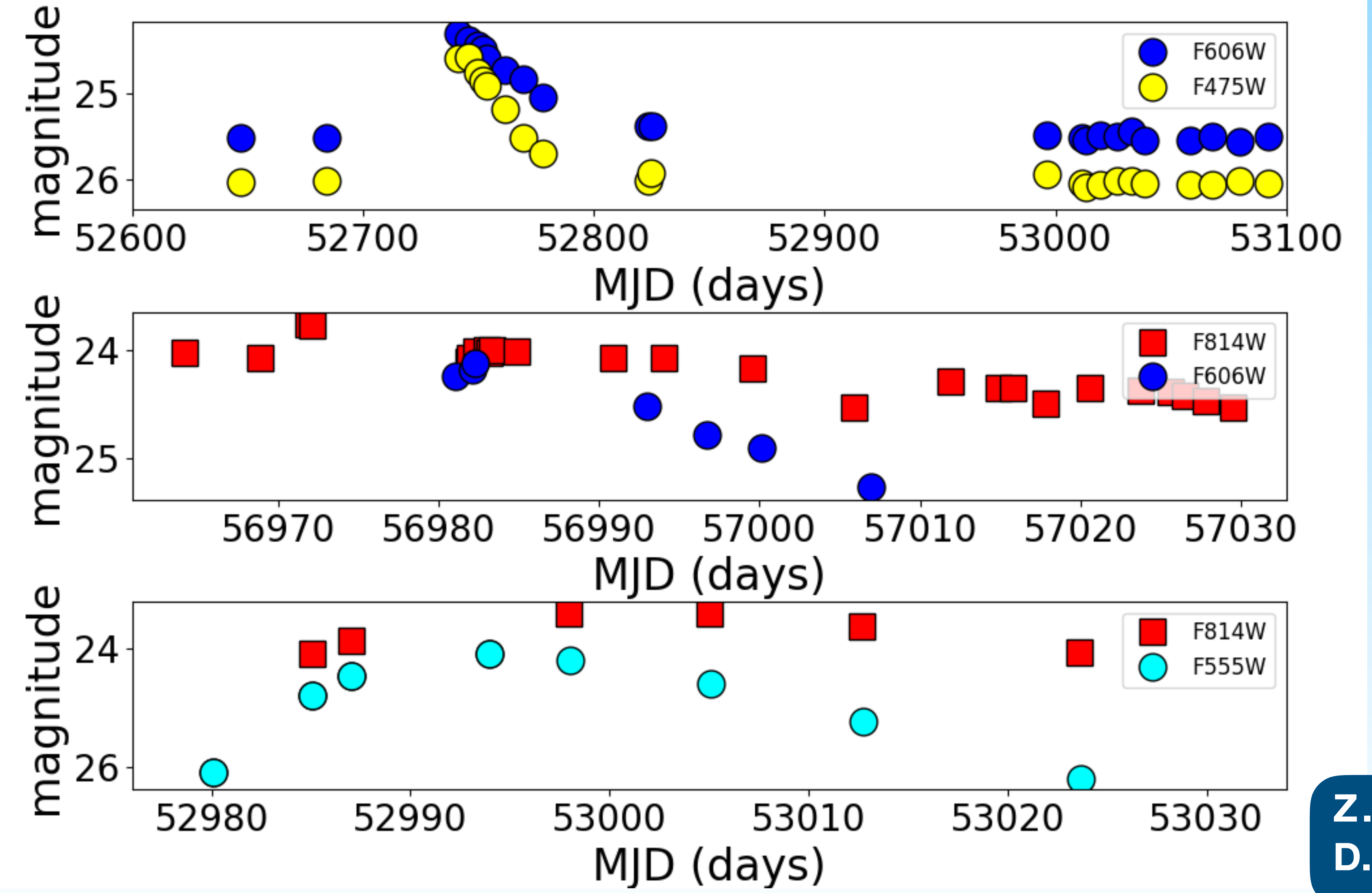


- This method can be used to search for Balmer-dominated Type Ia SNRs.

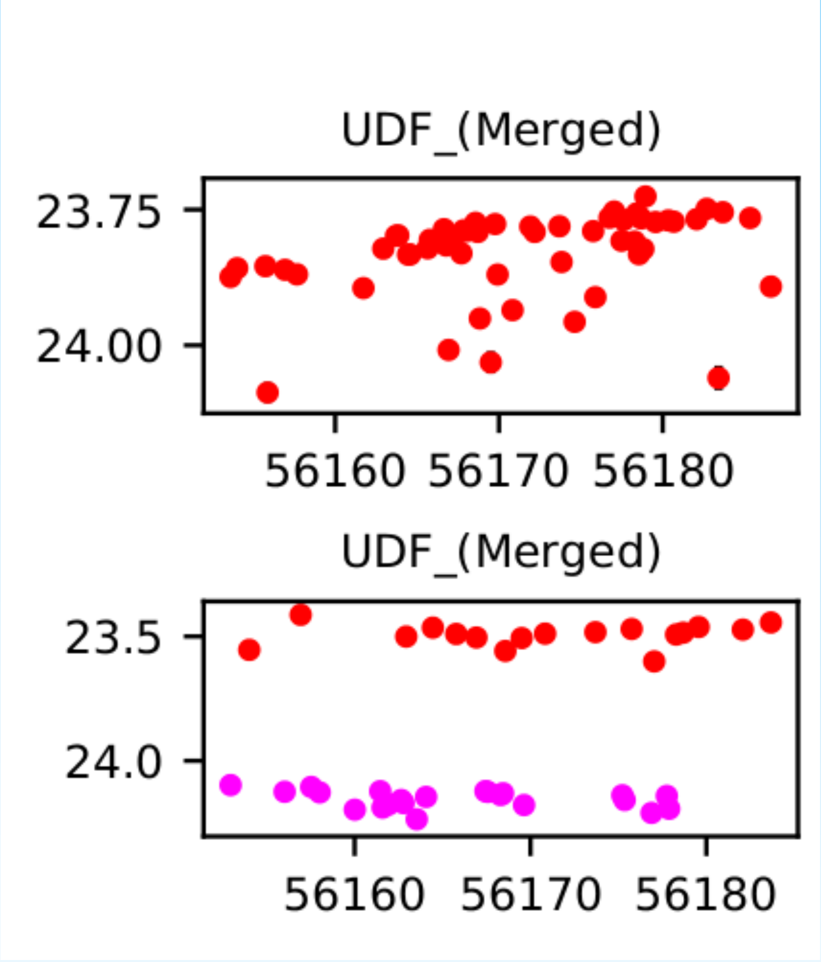
Transients, Supernovae and high-amplitude variables in the HCV

- We used the HCV to identify all variable stars with amplitude >1 mag
- ~ 830 NEW multi filter variable stars
- 7 non-reported transients among them 3 candidate SN
- 4 non-reported variable AGN
- 3 non-reported QSOs

New Candidate SNe



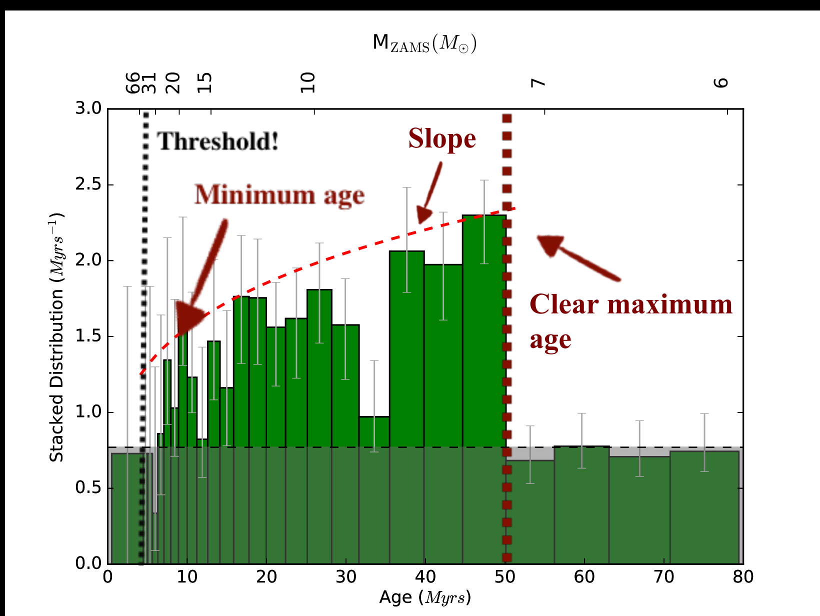
New variable AGNs

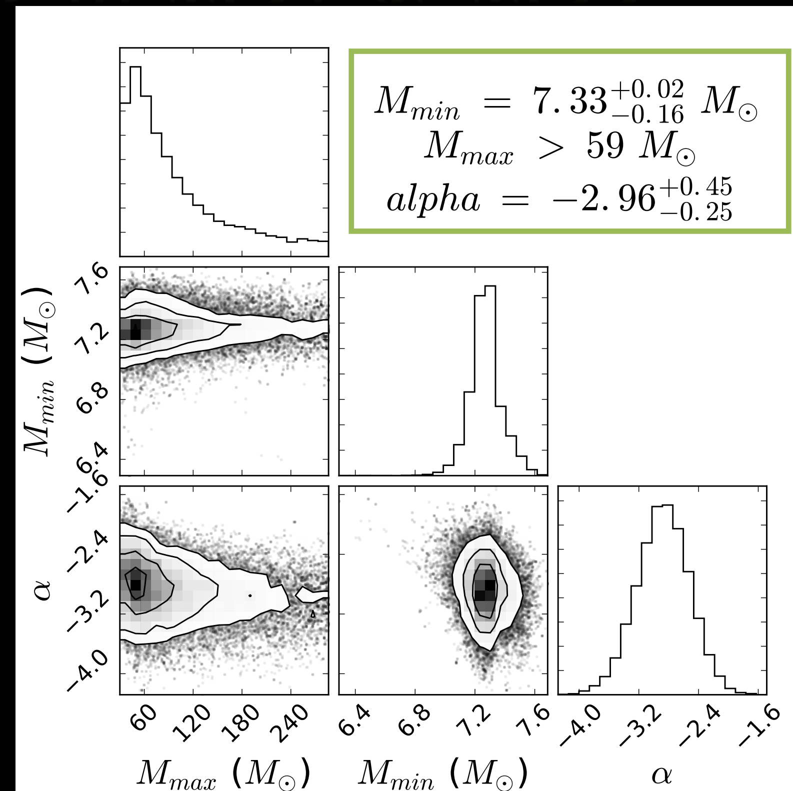


Z. Spetsieri, A.Z. Bonanos, D.Hatzidimitriou, M.Yang, I.Bellas

Progenitor Mass Distribution for Core Collapse Supernova Remnants in M31 & M33

- What is the minimum progenitor mass for these stellar explosions?
- Is there a maximum progenitor mass?
- Or more generally, what is the progenitor mass distribution?





Mariangelly Díaz-Rodríguez
md14u@my.fsu.edu

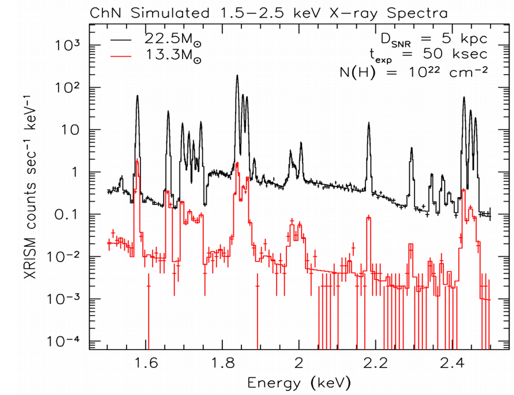
Goals:

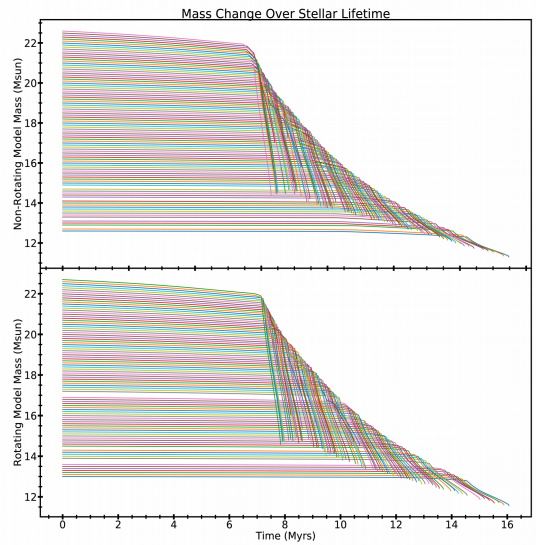
- Understand the progenitor mass distribution of SNe
- Develop statistical tool to help constrain the progenitor masses of CCSNe

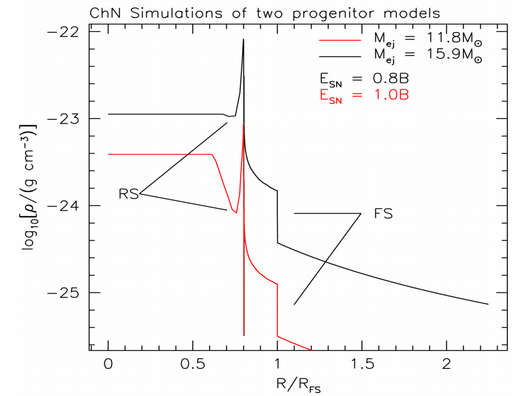
A Grid of Core Collapse Supernova Remnant Models Evolved from Massive Progenitors

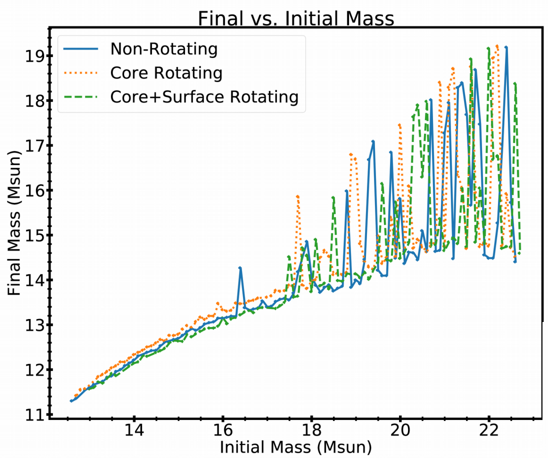
Key Takeaways:

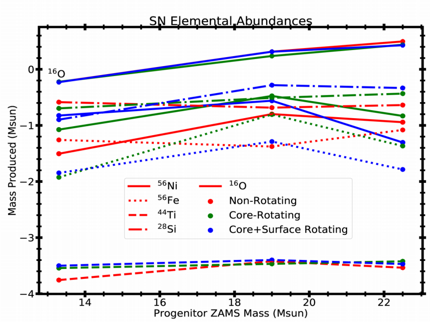
- 3 Grids of ~100 models each (Non-Rotating, Core-Rotating, Surface-Rotating)
  - Differences in Final Composition
  - Less obvious variation in SNEC
- Large variation in mass loss
  - Last 5e5yrs most important
- Clear quantitative spectral differences in the remnant

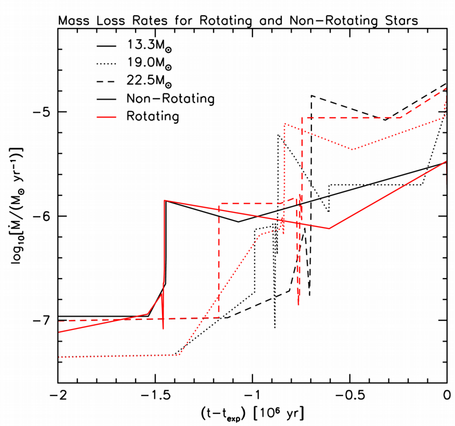












Caveats

- Only one mass-loss prescription (Dutch wind)
  - Other wind prescriptions change mass loss, especially in last 5e5 yrs
  - No Episodic Mass Loss
- SNEC output needs to be verified against literature
- ChN output is still preliminary
  - Incomplete for the grids
  - No Cosmic Ray emission in final spectrum

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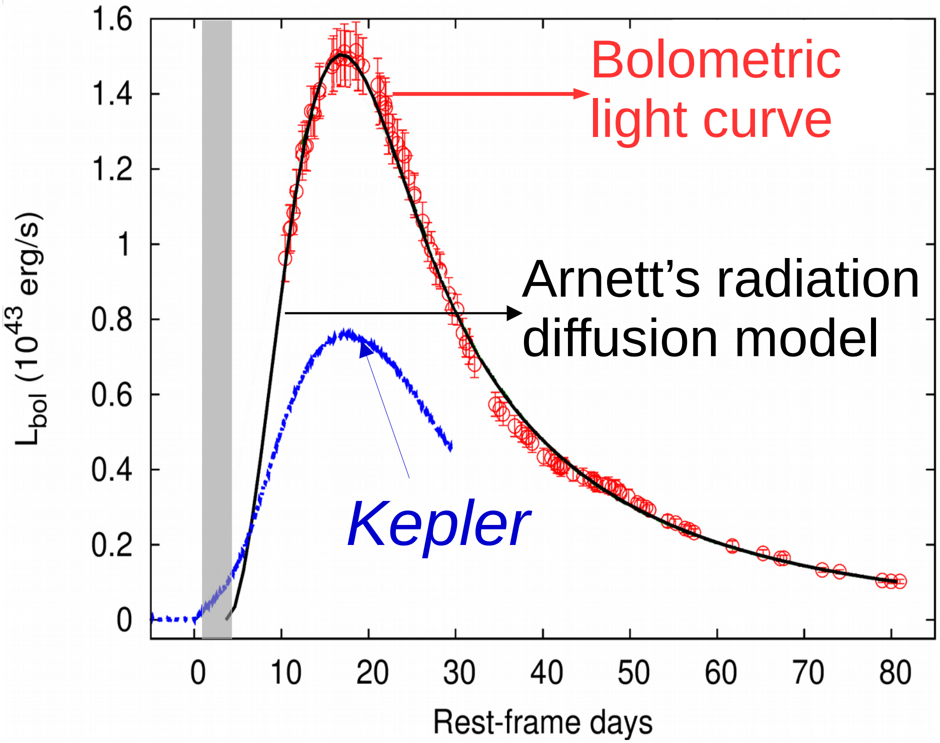
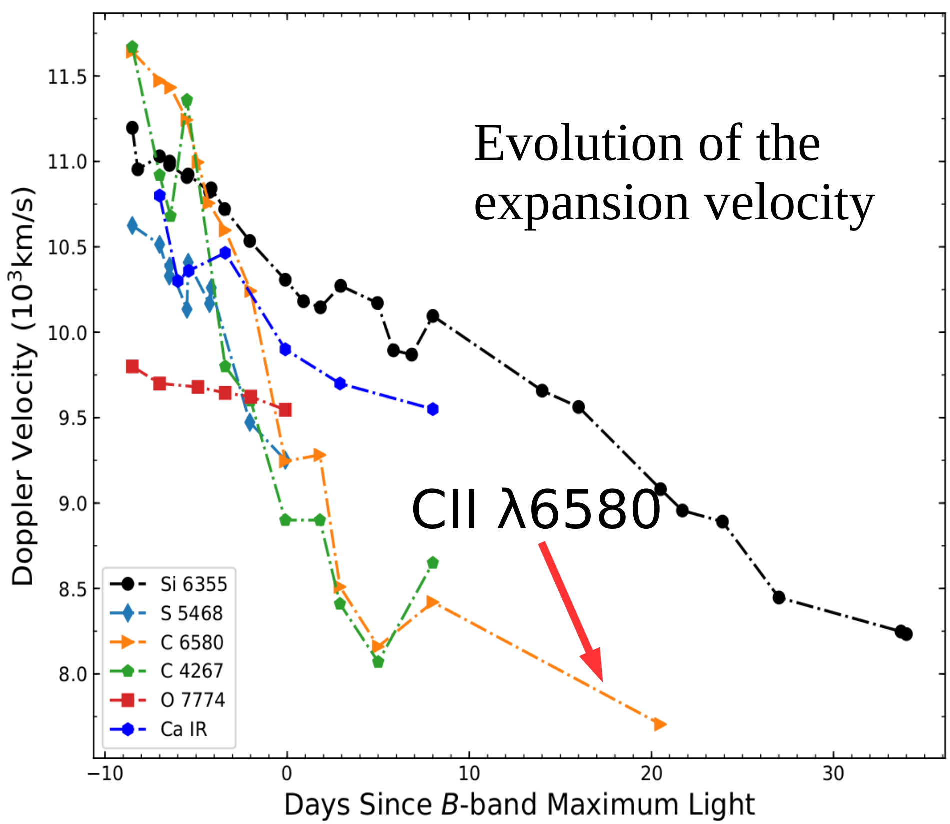
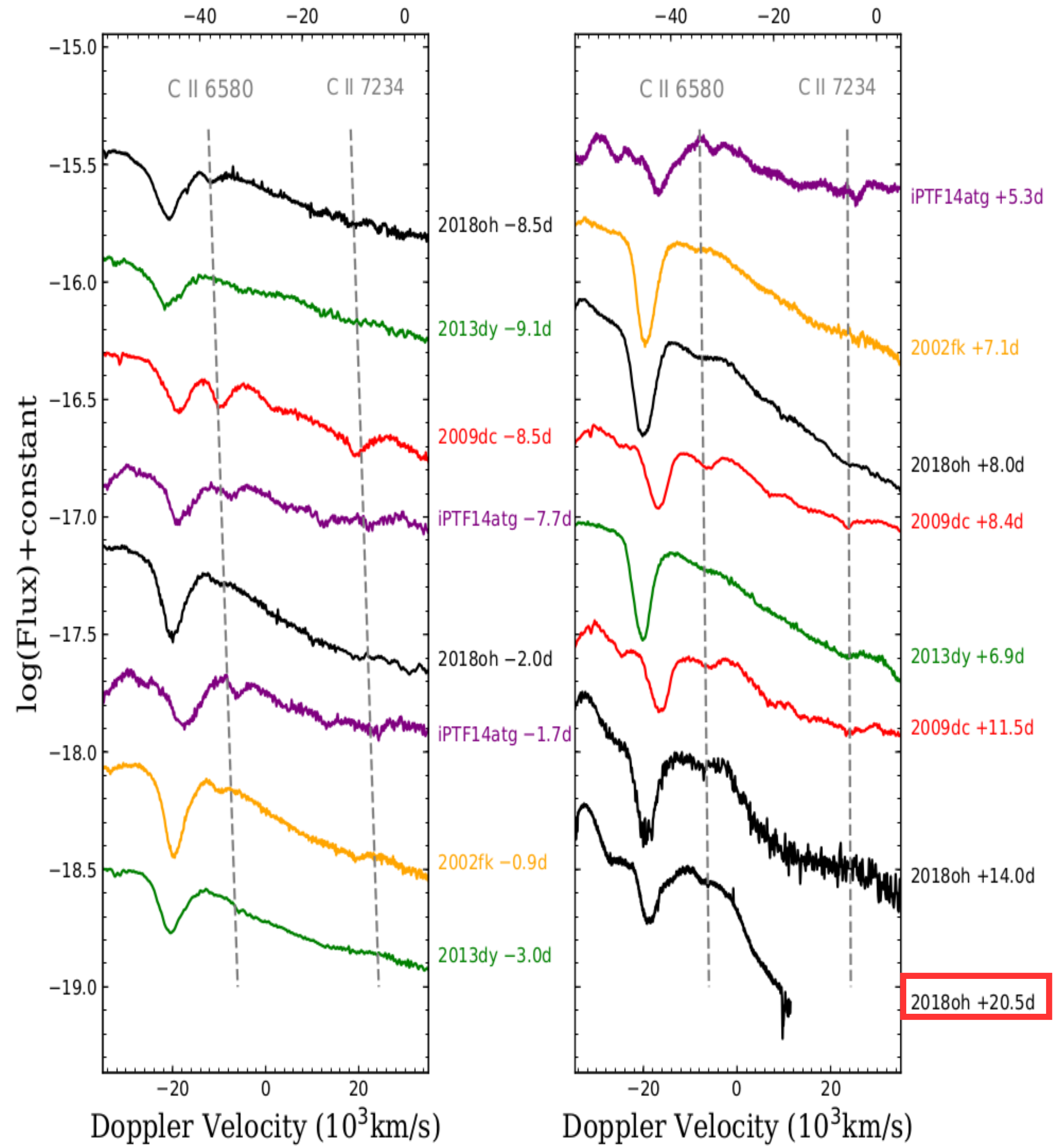
Constraints on the ejecta properties of SN 2018oh with early excess emission from K2 Observation

Wen-xiong Li (THU)







C II λ6580 evolution of SN 2018oh compared to that of other SNe Ia.

Is There a Critical Metallicity of Mass Loss in Massive Star Evolution?

Po-Sheng Ou （歐柏昇）, Ke-Jung Chen （陳科榮）

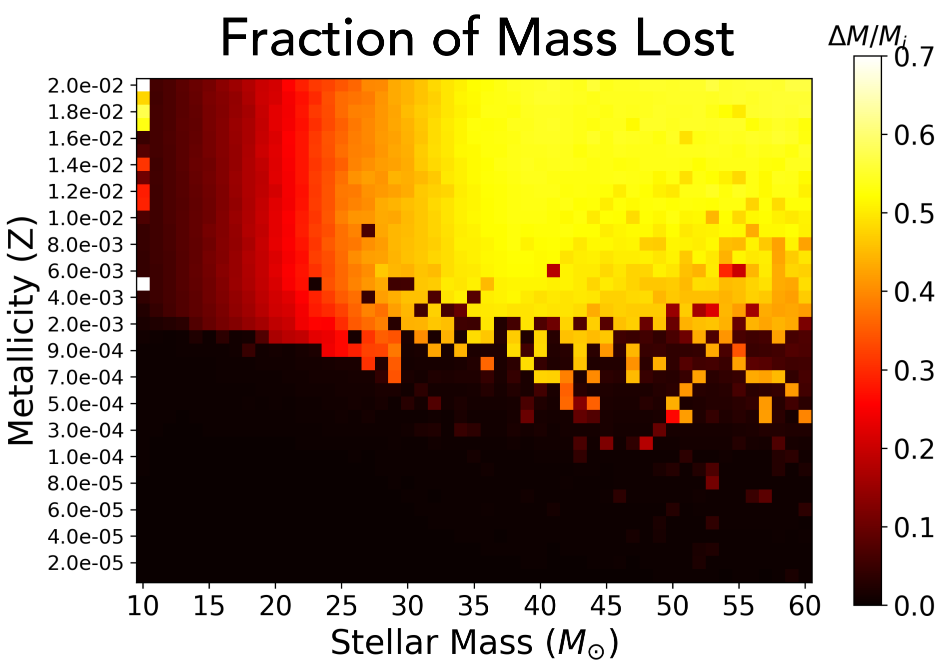
Mass loss recipes	$X_S<0.4$	$X_S>0.4$
$T_{eff}>10^4$K	WR wind (Nugis) $\dot{M}(L, Y, Z)$	Hot wind (Vink) $\dot{M}(L, T_{eff}, M, v_{inf}, Z)$
$T_{eff}<10^4$K	Cool wind (de Jager) $\dot{M}(L, T_{eff})$	

→ **MESA code stellar evolution**

↓

ΔM=?

K.E.=?



Metallicity

High	Z_C~0.001	Low

↓

Can it evolve to the RSG stage?

Yes	No

↓

Total mass lost

High	Low

Constraining massive star activities in the final years through properties of supernovae and their progenitors

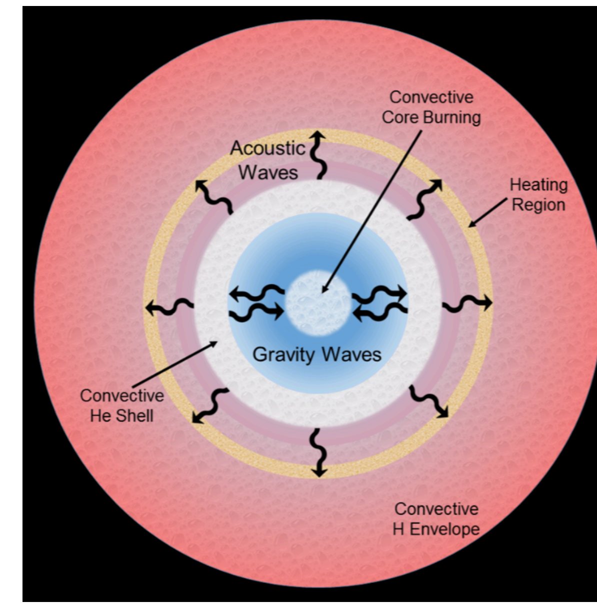
S2. 15

Ryoma Ouchi, Keiichi Maeda

- The energy deposition into the envelope in the last few years might produce **the confined CSM.**

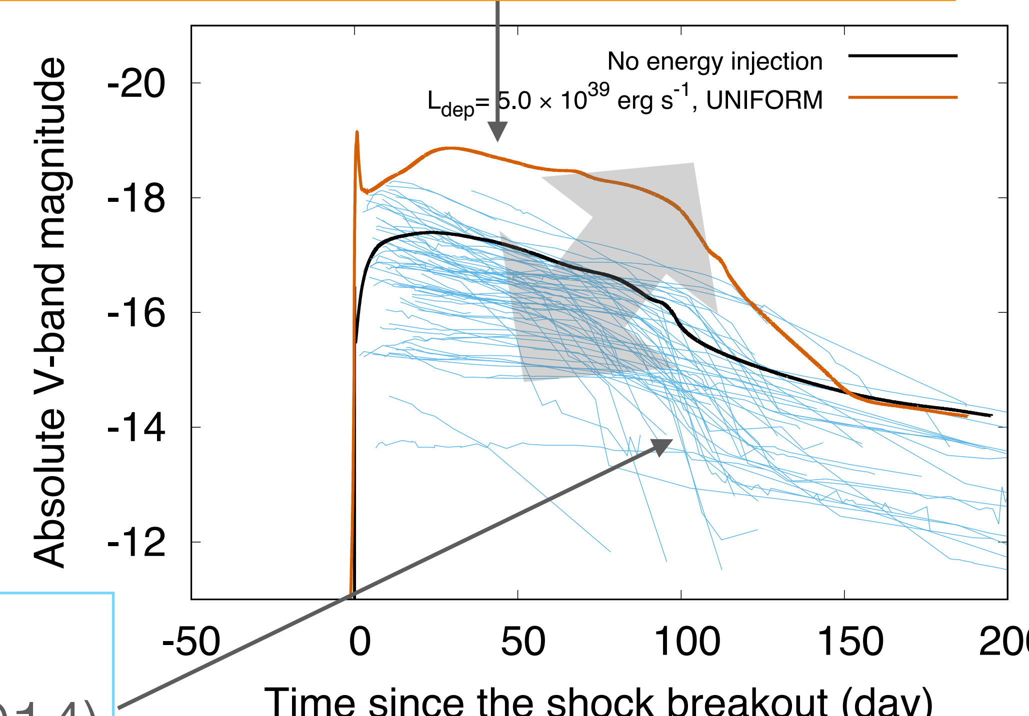
→ We have investigated the effect of the pre-SN energy deposition on the progenitor and SN.

→ **A constraint has been derived** on the pre-SN energy injection rate to explain the usual SNe II.



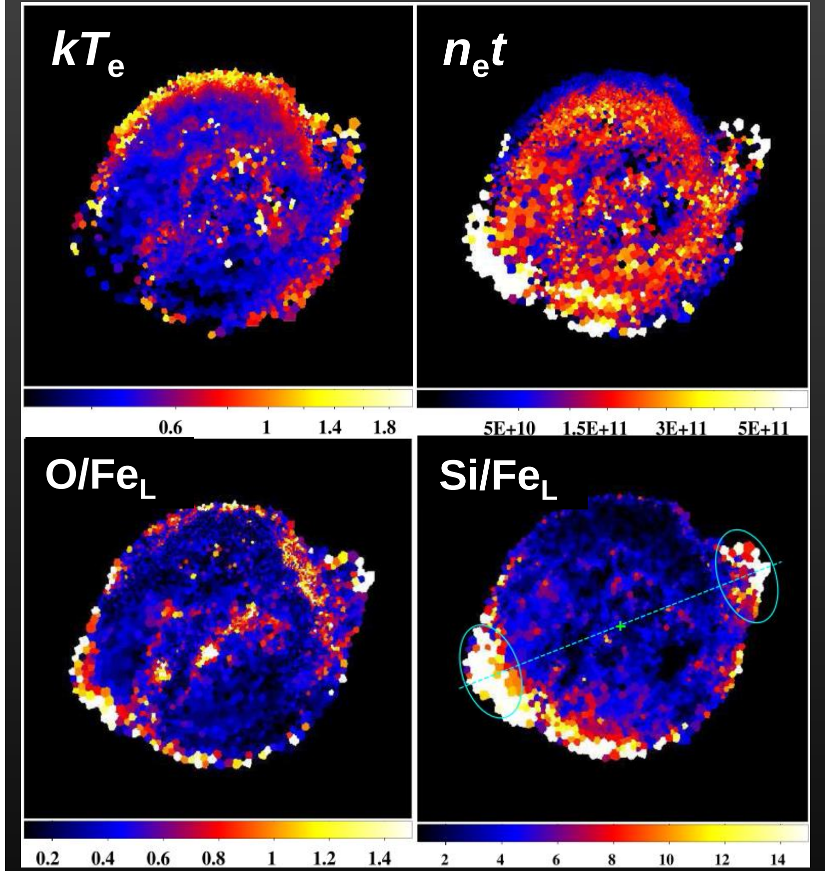
Fuller 2017

Model with pre-SN energy injection



Data for SNe II
(Anderson et al. 2014)

X-ray Emission From Kepler's SNR



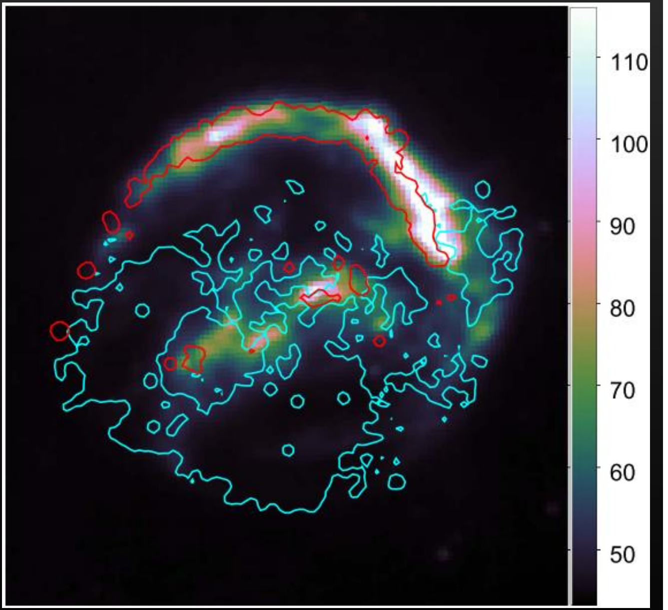
Spatial distributions of multiple physical parameters

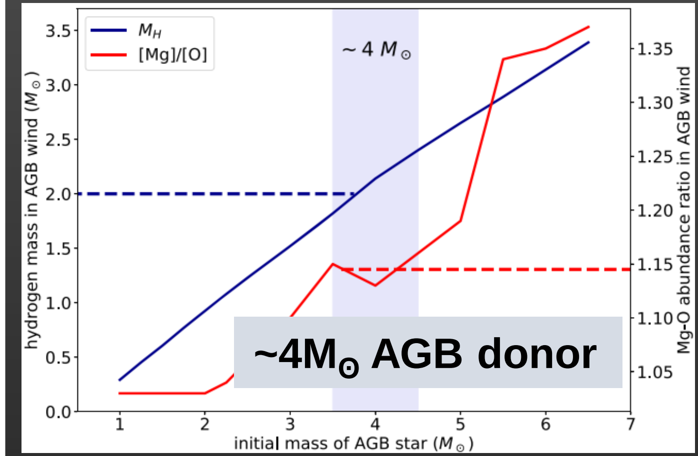
Sun & Chen 2019, ApJ, 872, 45

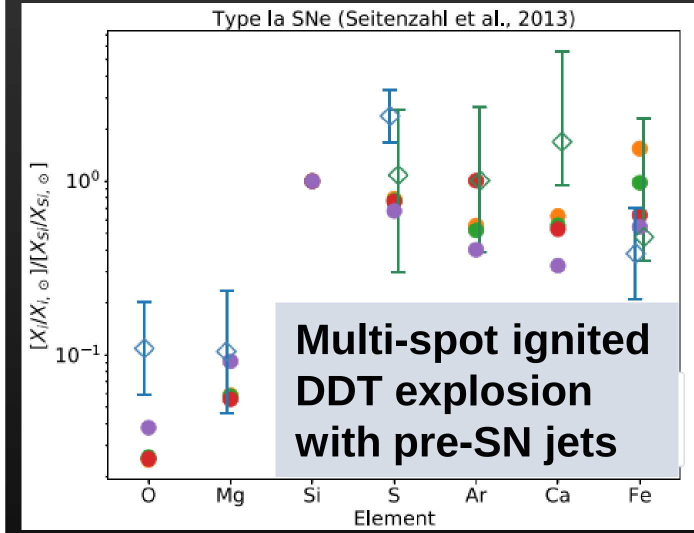
Poster presentation by **Lei Sun**

SNR II @ Crete, Greece

Distinct properties between CSM and **ejecta**







Further implications of the progenitor and explosion mechanism

The Signature of a Windy Radio Supernova Progenitor in a Binary System

Almog Yalinewich