Sub-luminous SNe Ia in the NIR

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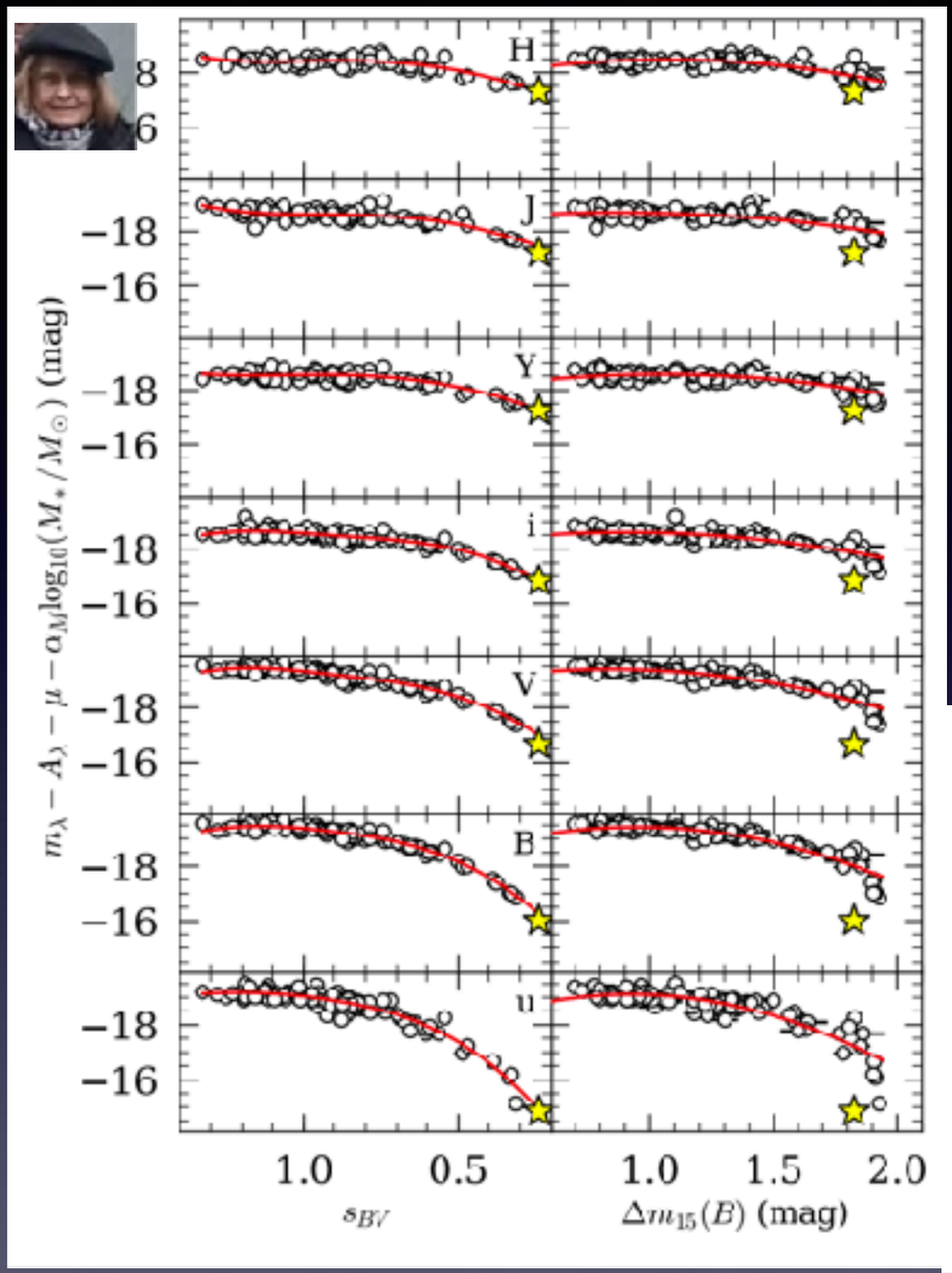
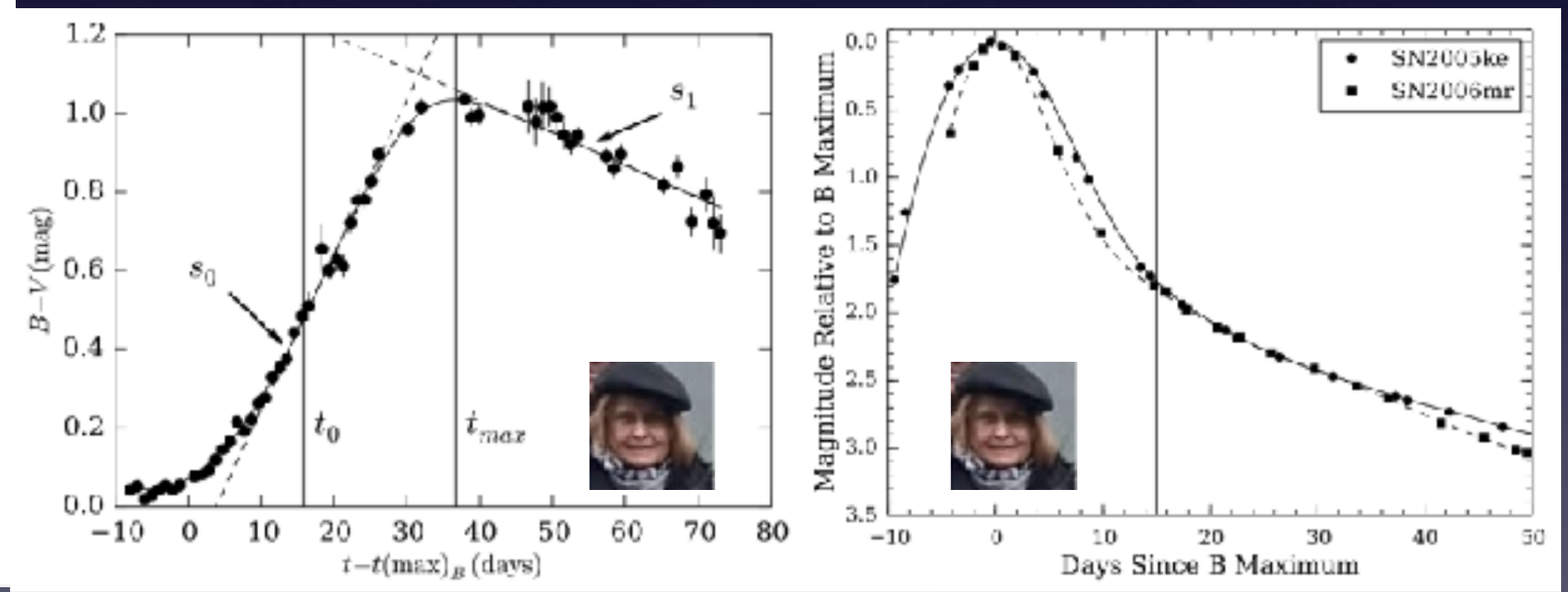


- Continuous distribution implies one explosion scenario dominates



Burns, C. et al, 2018

Burns, C. et al, 2016

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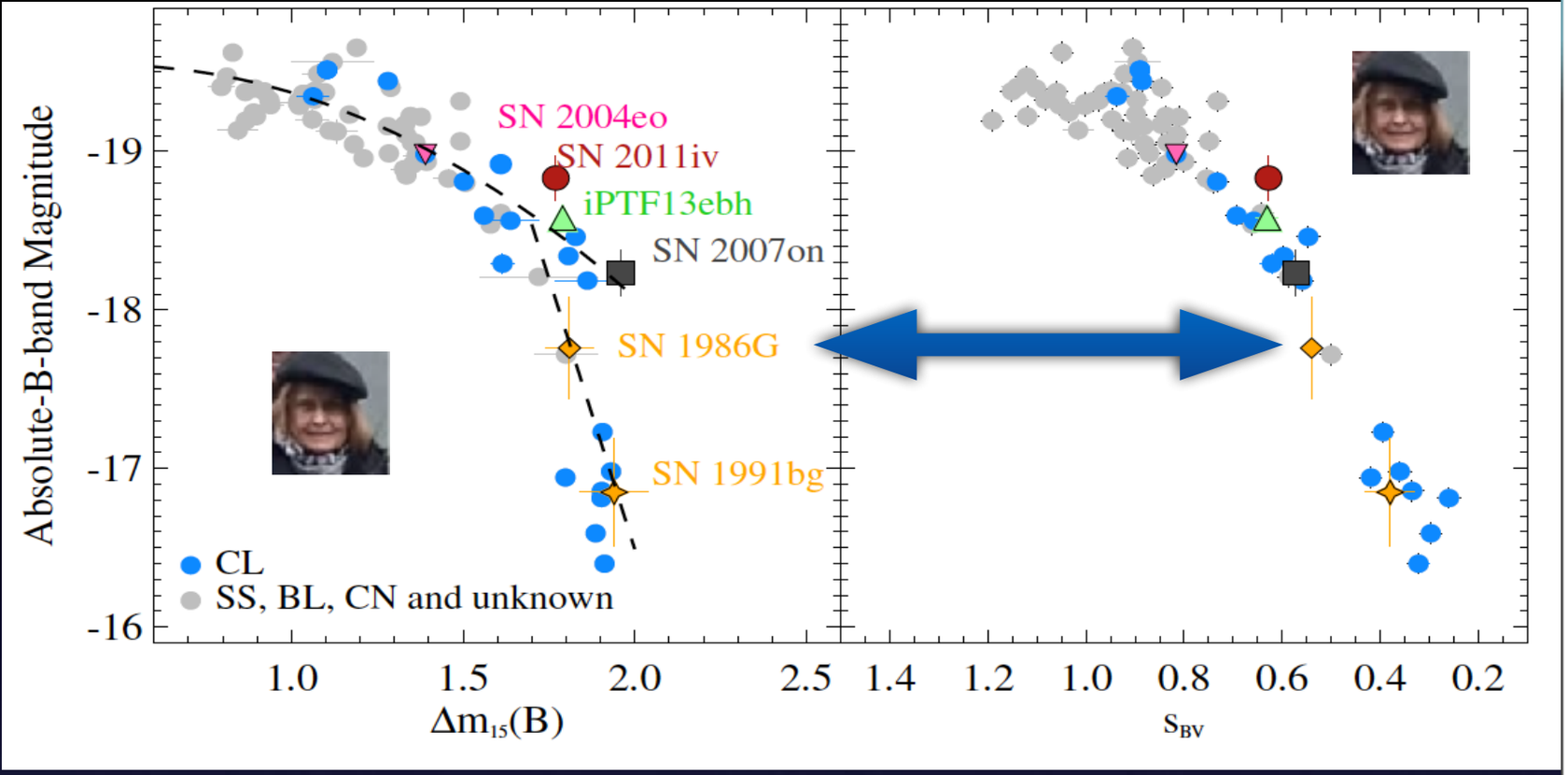

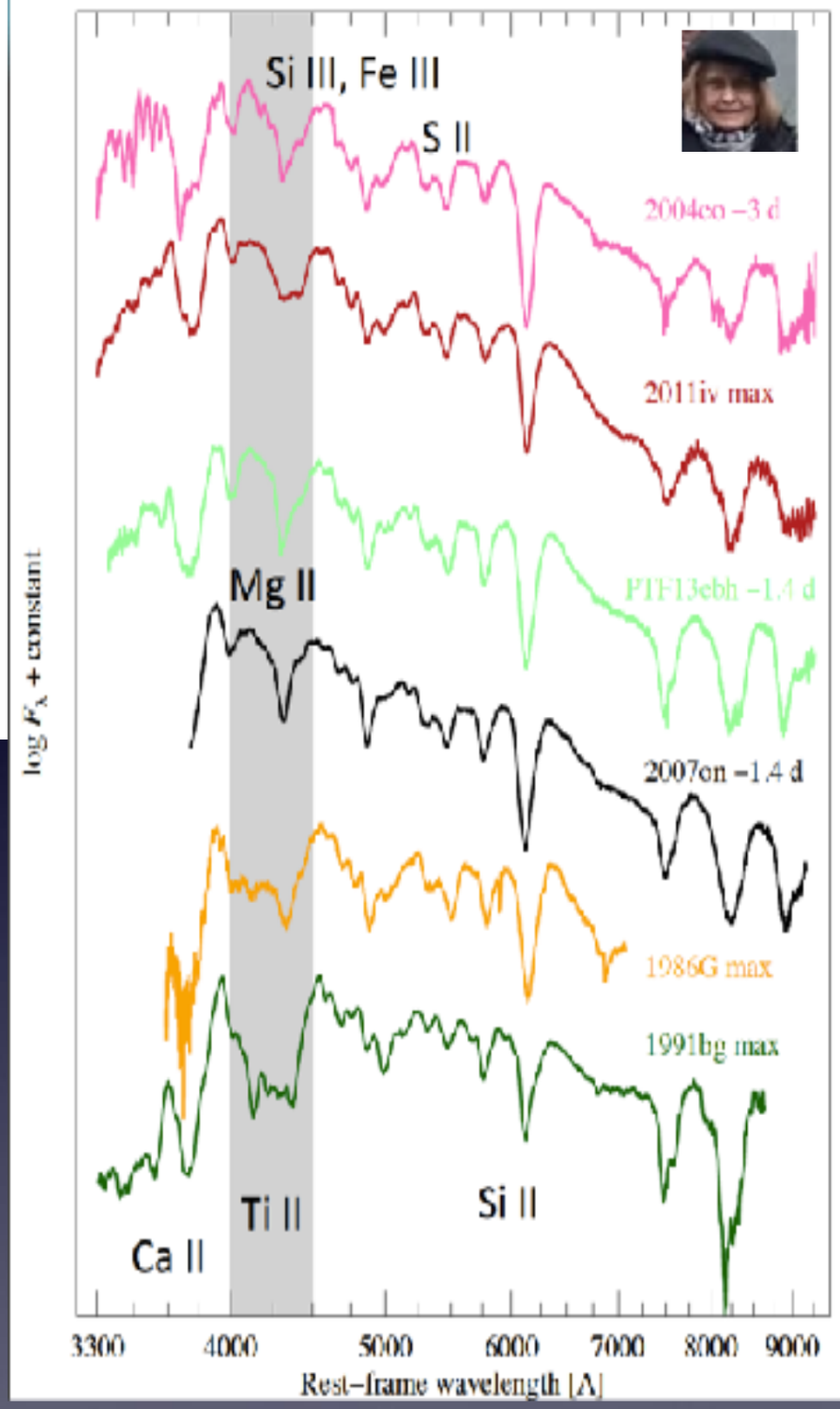

Gall, C. et al, 2018

- More sensitive to small physical changes

- Show more diversity

- Less 56Ni, different nuclear burning and flame physics

- What links normal and sub luminous SNe Ia?

- How are these subtypes connected?

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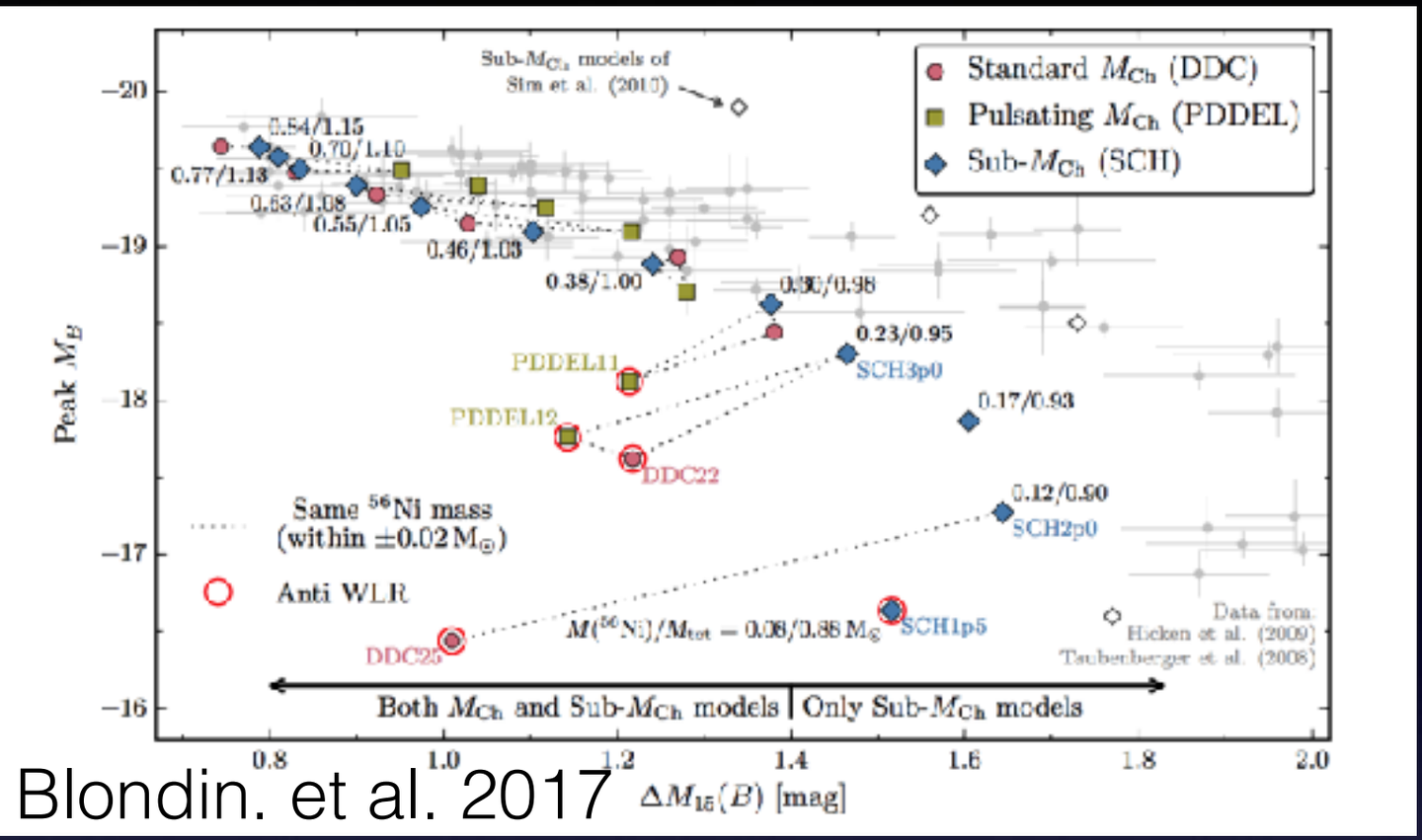
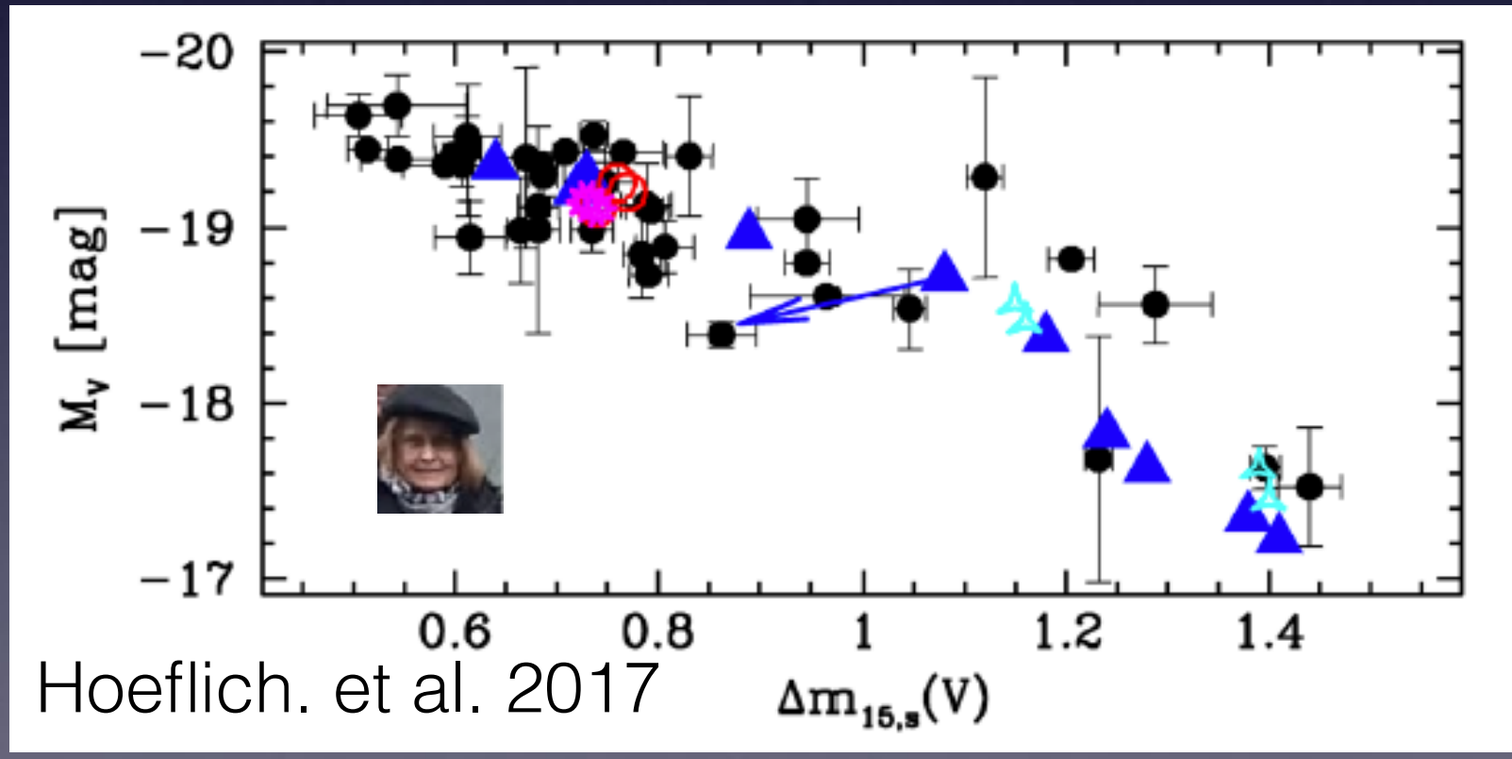


Blondin. et al. 2017

- Is the normal SN Ia population composed of a single or multiple triggering mechanisms?

- Are sub luminous SNe from a separate populations than normal SNa Ia?



Hoeflich. et al. 2017

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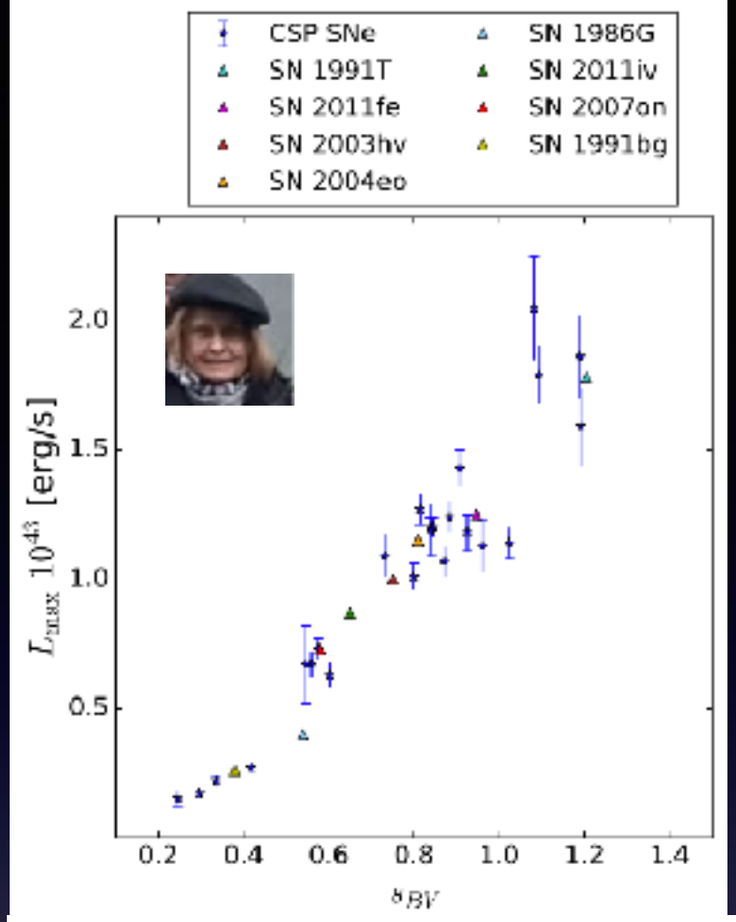
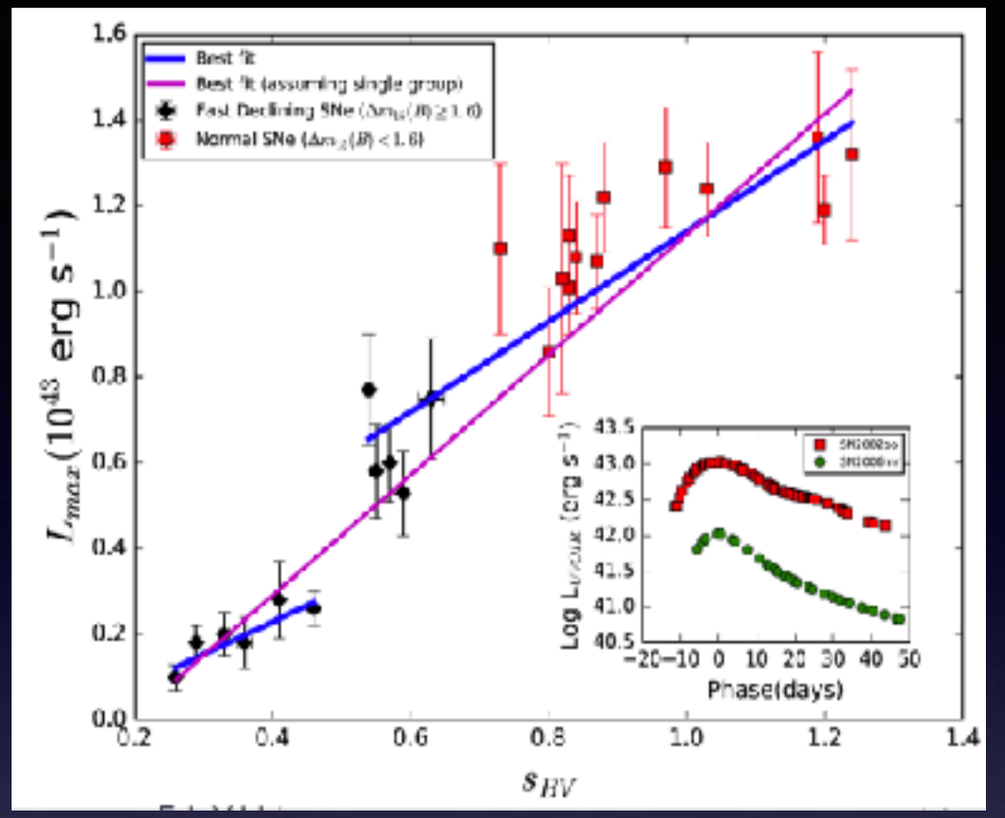
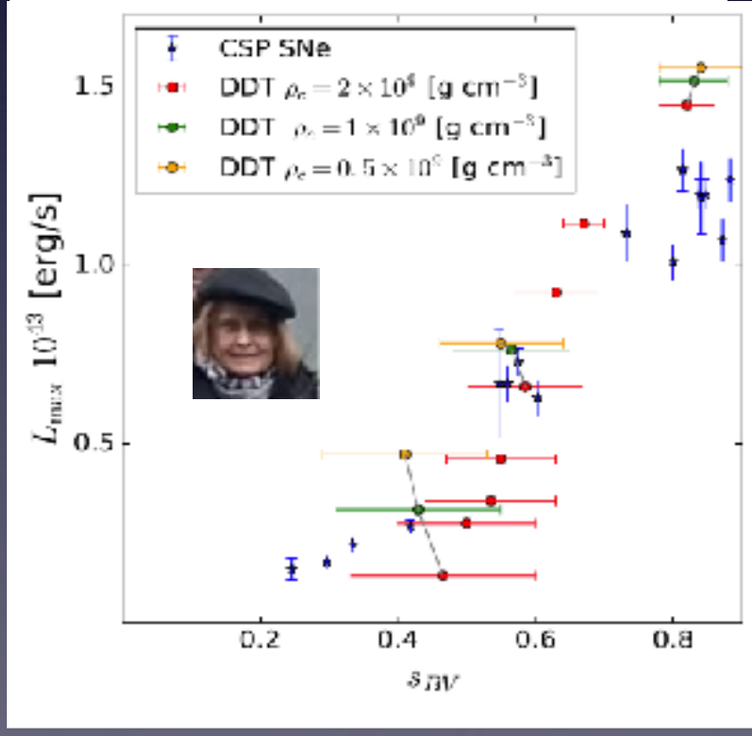
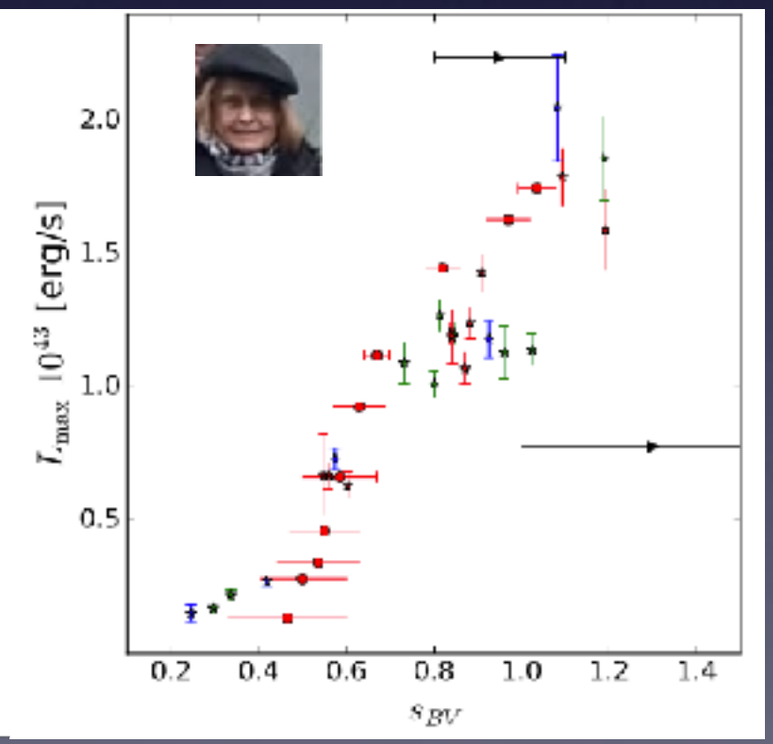


- Bolometric LCS are consistent with delayed detonation models and one population



Dhawan. et al. 2017





Ashall. et al. 2018

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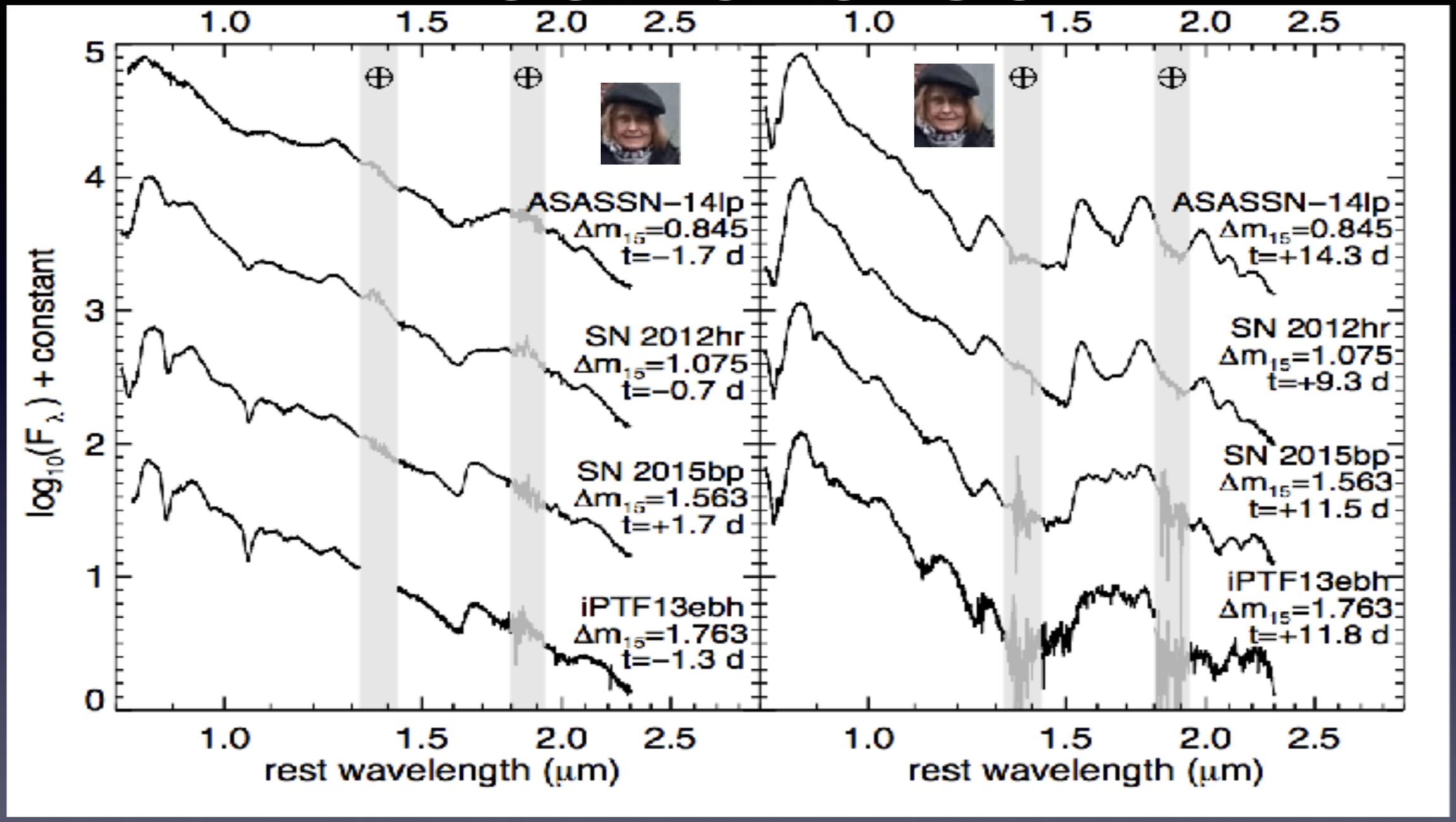
H-band break



Hsiao . et al. 2018

- Large amount of Co/Fe emission lines around 1.57μm, linked with 56Ni distribution

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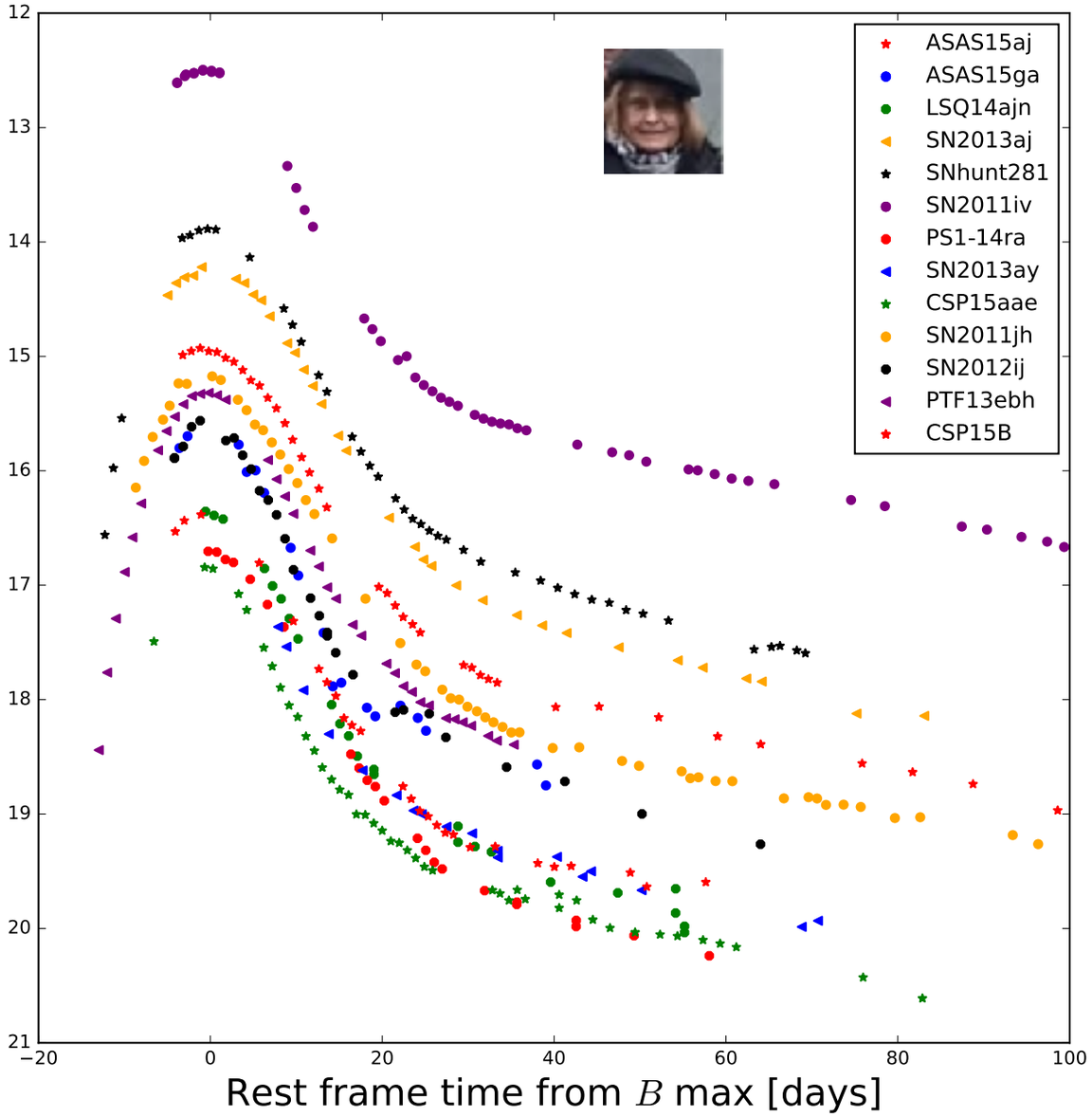

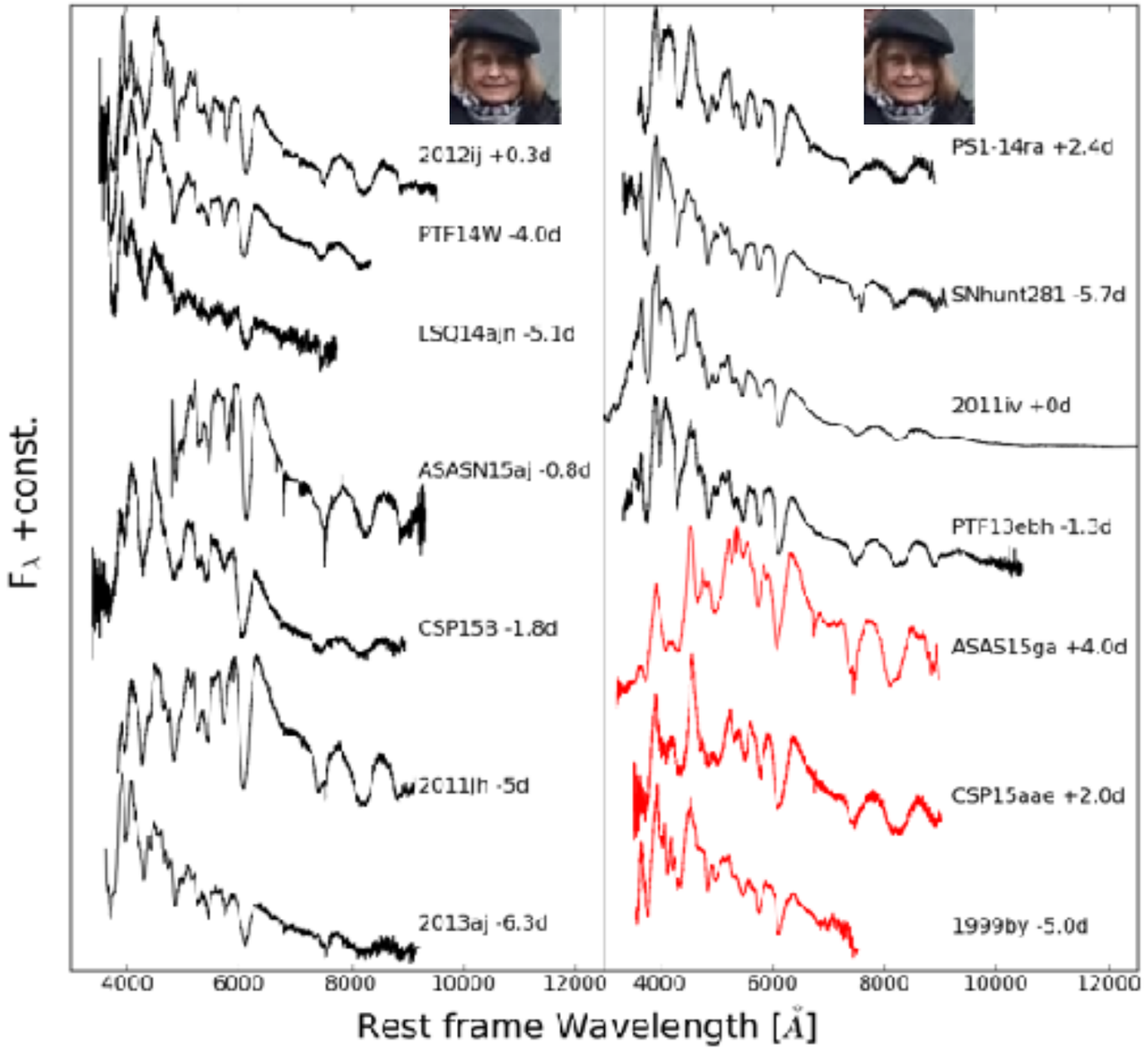

- 15 SNe Ia $s_{BV<}$ 0.7
- SN sample is transition (11) and sub luminous (4)
- 21 spectra between +7 to +20 days

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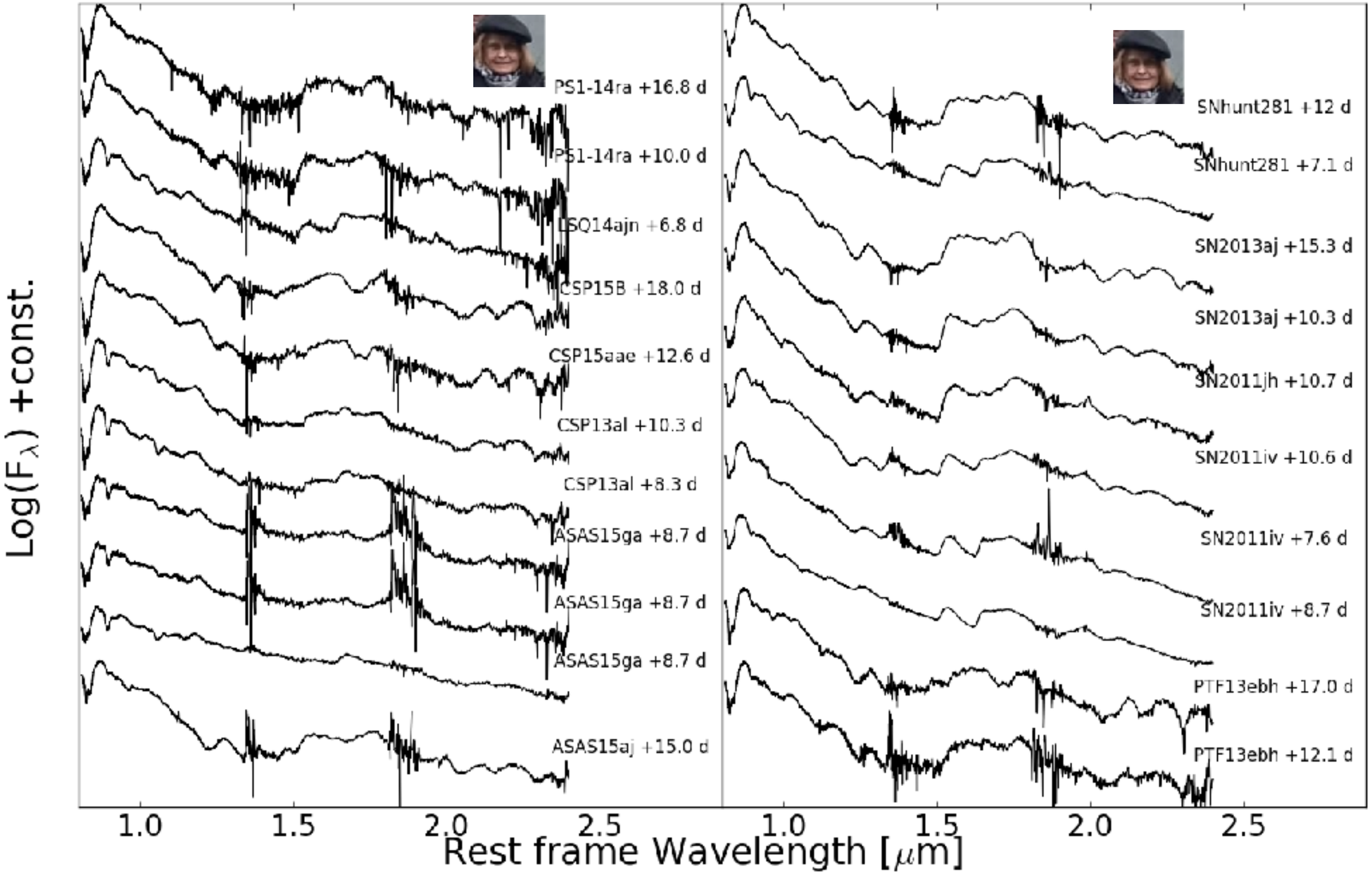

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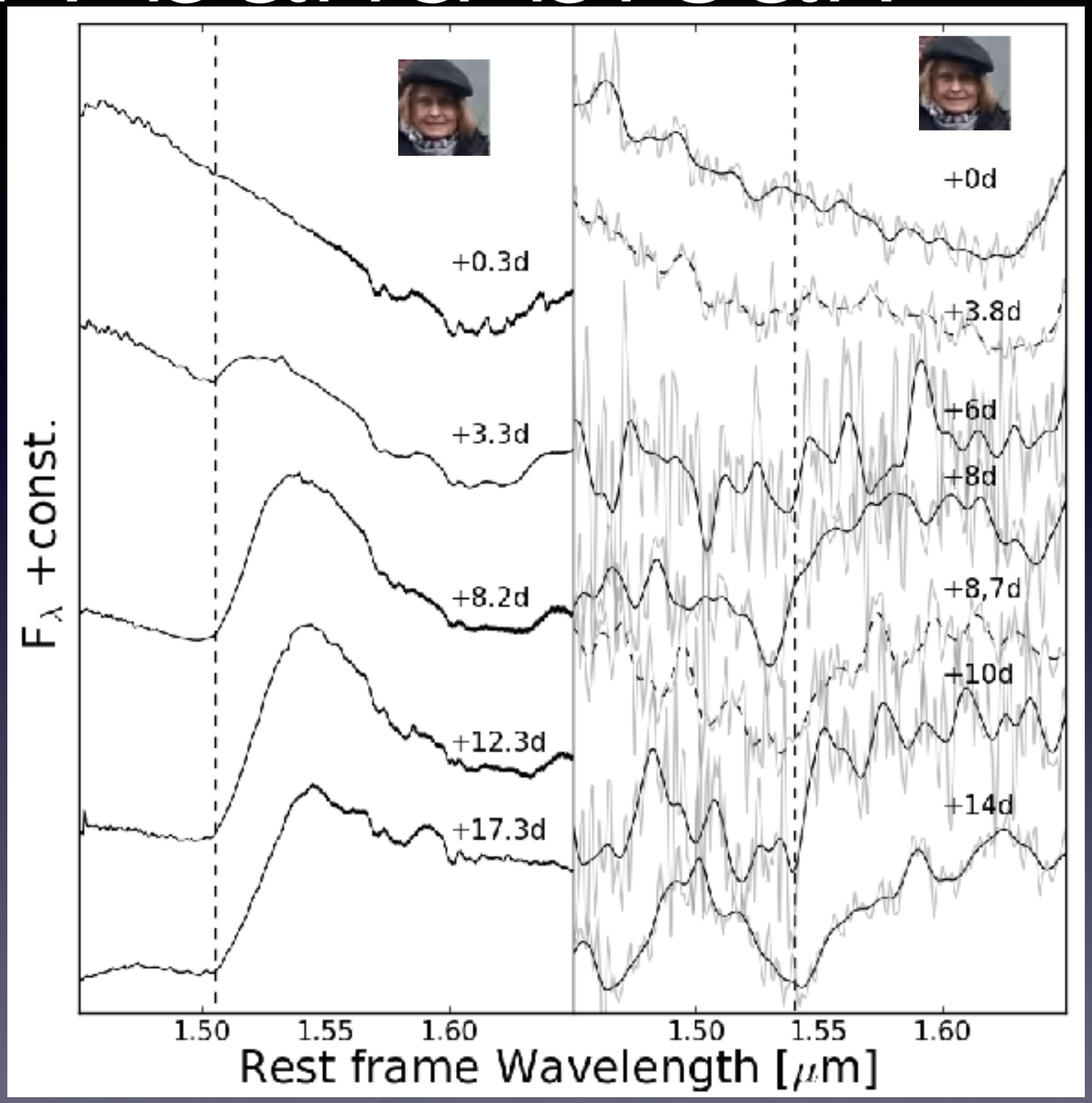
Time of H-band break

- Ch-mass models predict H-band break is earlier in brighter SNe
- This is seen with SN2011fe and SN1999by
- Ejecta masses roughly similar.



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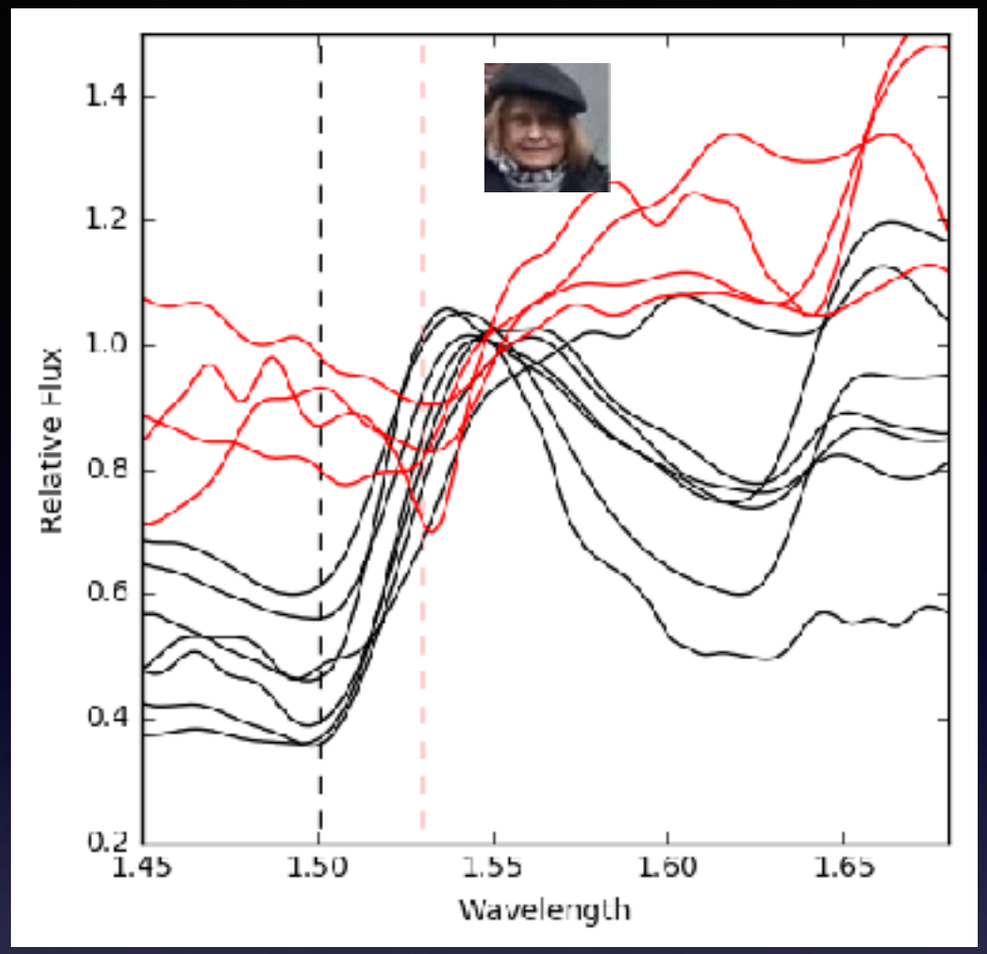
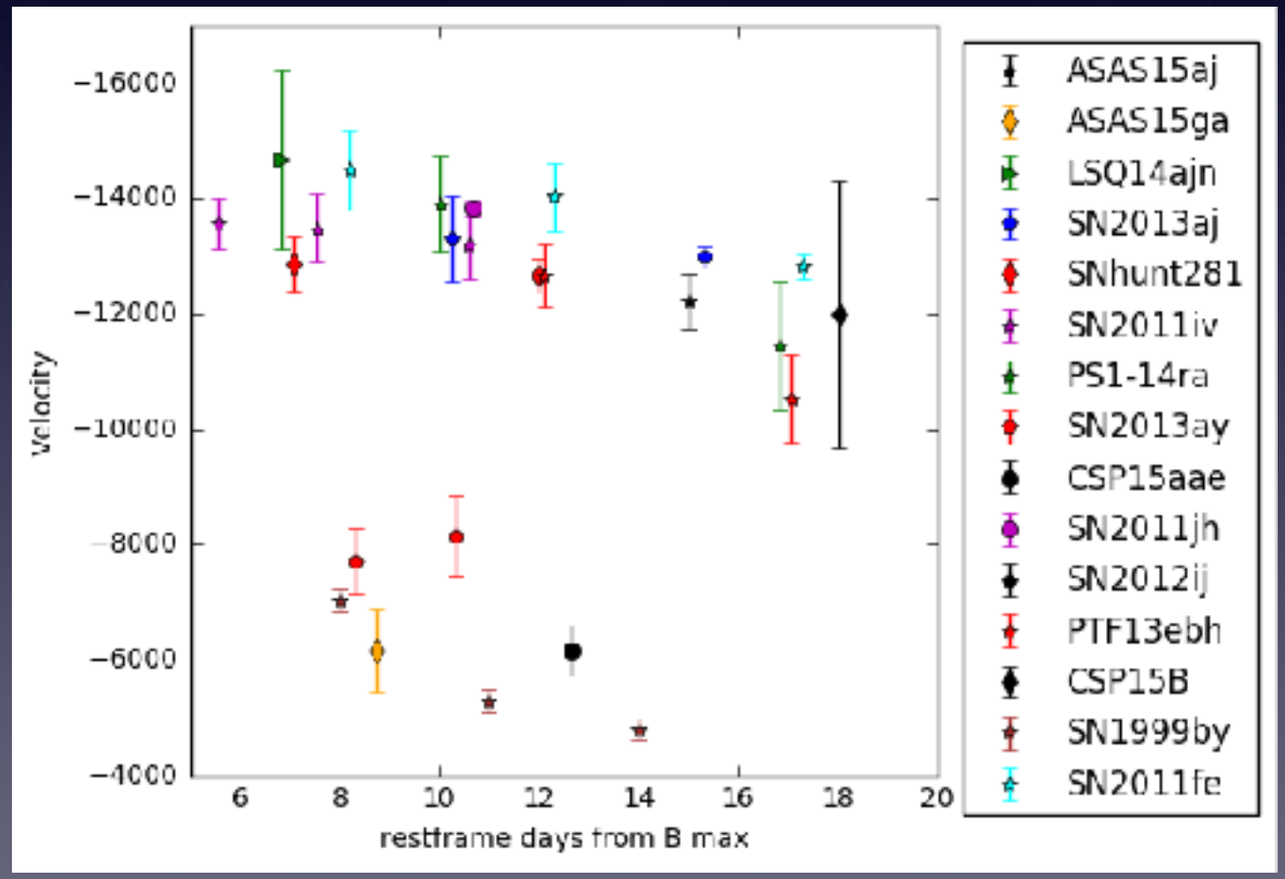


- Minima of transitional objects 13000 km/s
- Minima of sublum objects 7500 km/s



- Sub-luminous objects have ^{56}Ni located at lower velocities

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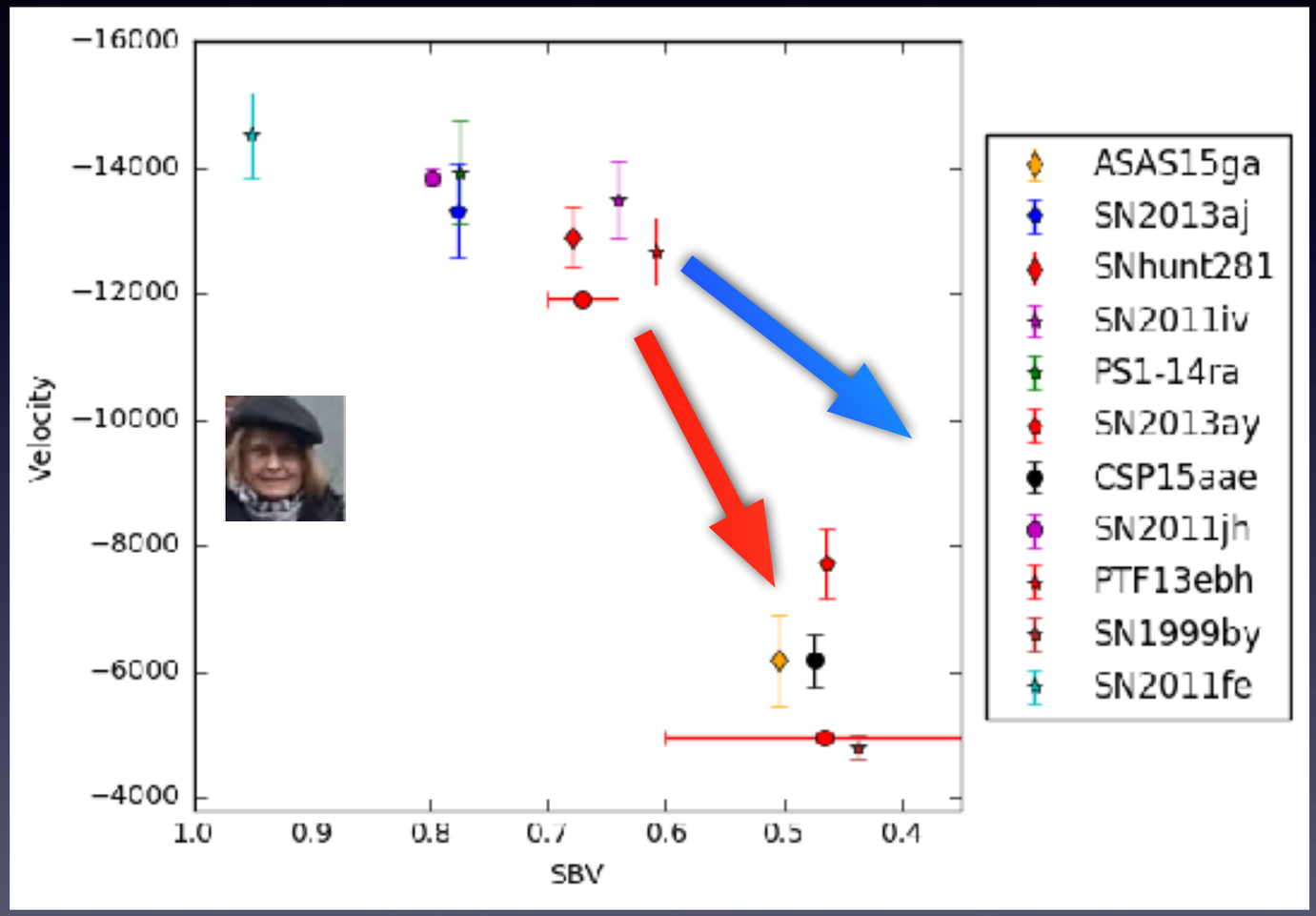
- Correlation between LC shape and location of ^{56}NI
- NIR spectra demonstrate sub-luminous SNe Ia are consistent with (near) Ch-mass delayed detonation explosions
- Most sub Ch-mass models predict ^{56}NI at higher velocities



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Conclusion

- Optical and bolometric light curves, and NIR spectra show that normal and sub-luminous SNe Ia can be thought of as a one parameter family, which is consistent with (Near) Ch-mass explosions.
- This does not mean they are the only scenario we observe.
- Don't mix ignition mechanism and progenitor scenario.
- Most data was observed by Nidia!
- We cannot determined between 1.2M sub Ch-mass and Ch-mass explosions yet, but very early time (accretor) and MIR (Mn, Cr) spectra will be able to help.