FITTING SUPERNOVA SPECTRA USING SYNOW

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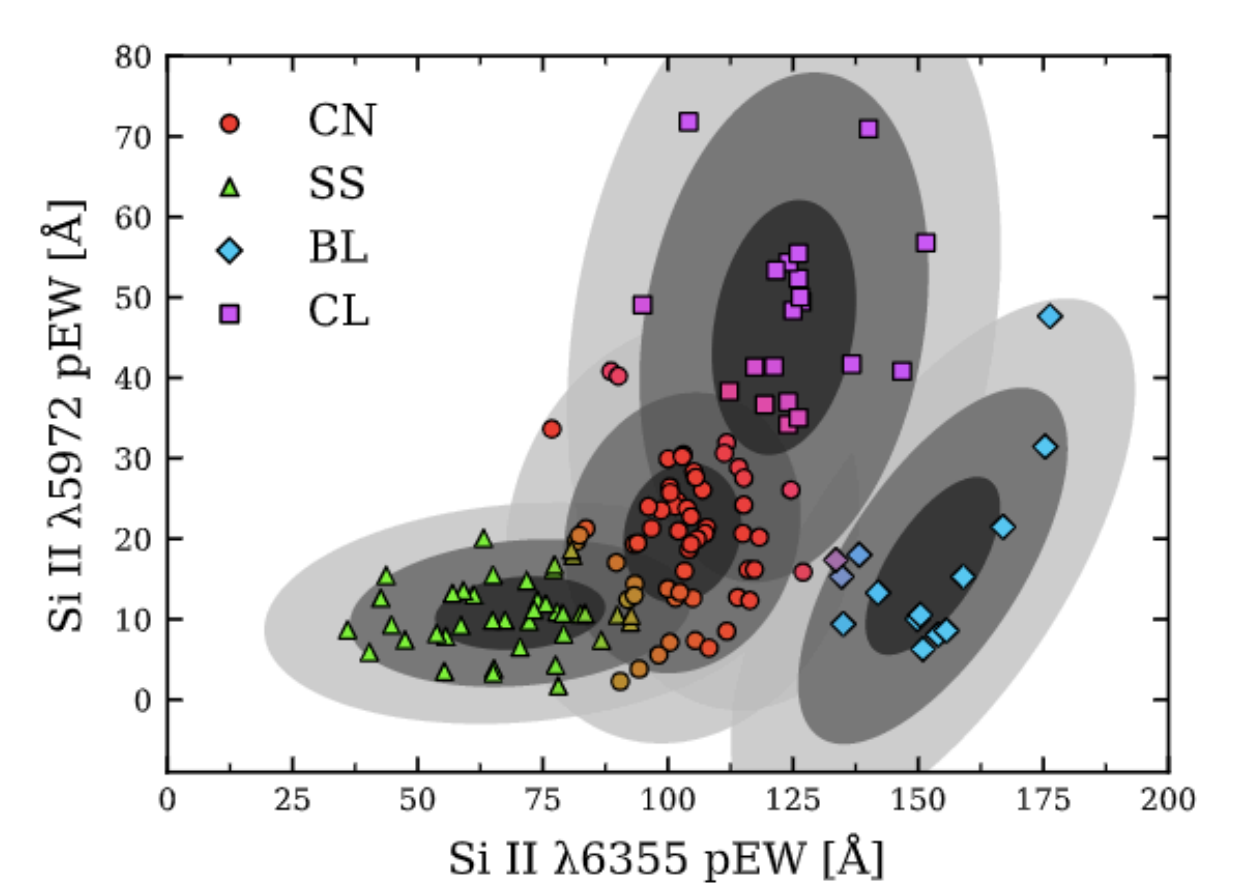
Background

- A supernova is an explosion of a star that throws matter into space
- Type Ia supernovae are caused by thermonuclear disruptions of white dwarf stars
- Heavy elements are either produced by nuclear fusion before the explosion or produced during the explosion

Remnant of Supernova 1987A. Image taken from https://hubblesite.org/image/3987/gallery/35-supernova-remnants

SN 2021fxy

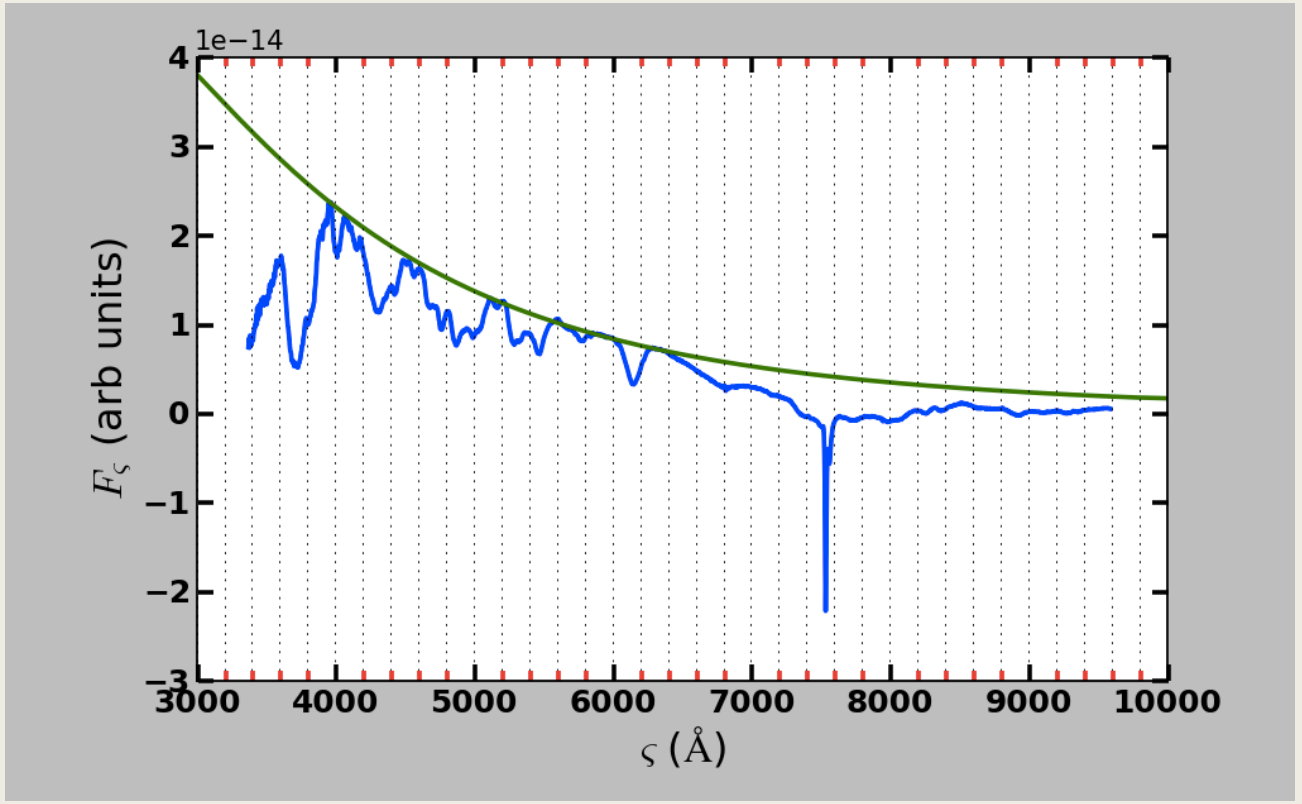
- Type Ia; produces a strong red absorption line produced by singly ionized silicon
- Want to figure out its Branch group: core-normals, shallow-silicons, cools, or broad-lines

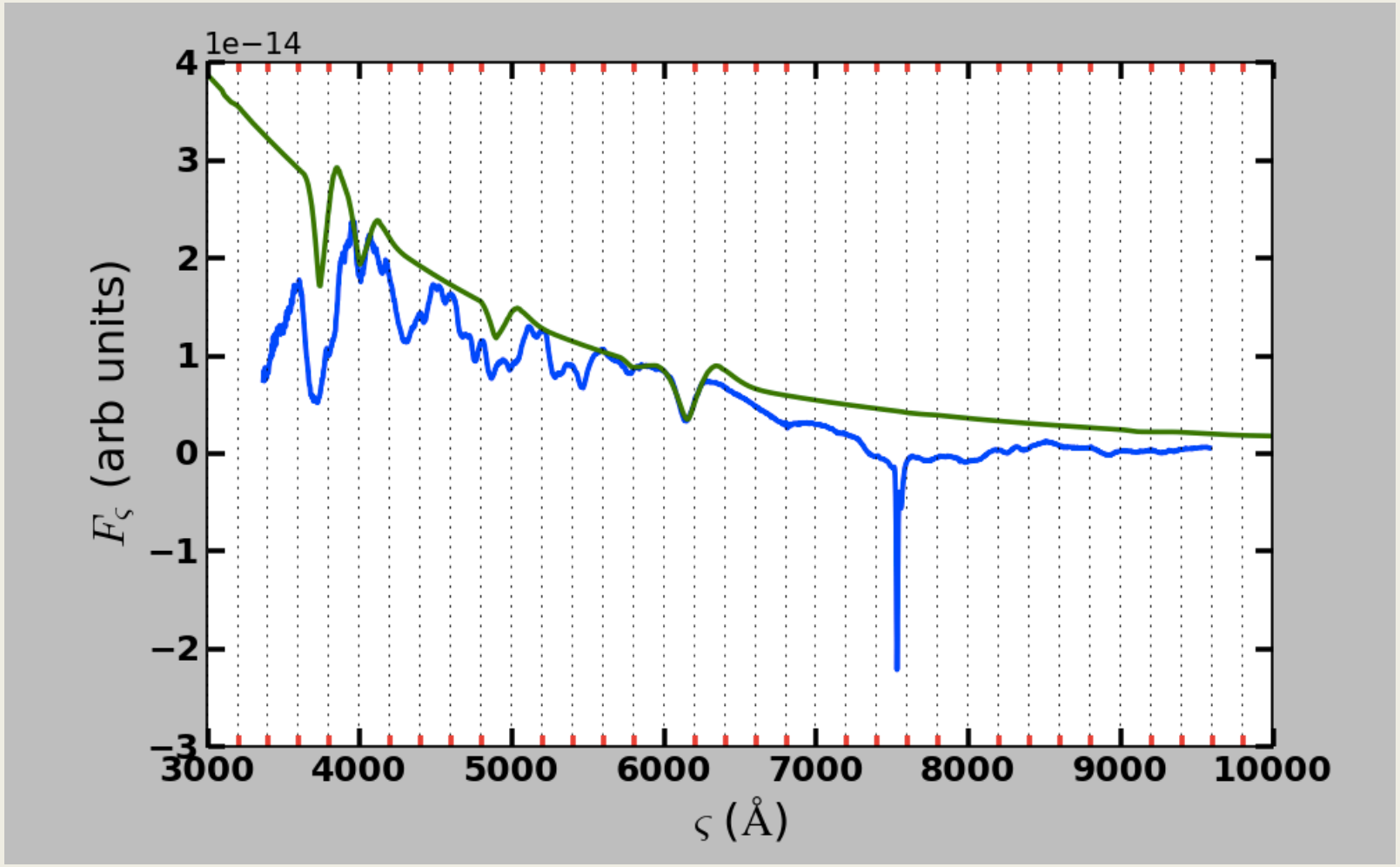


Branch diagram of various type Ia supernovae.
Image credit: Burrow, A. et al. 2020

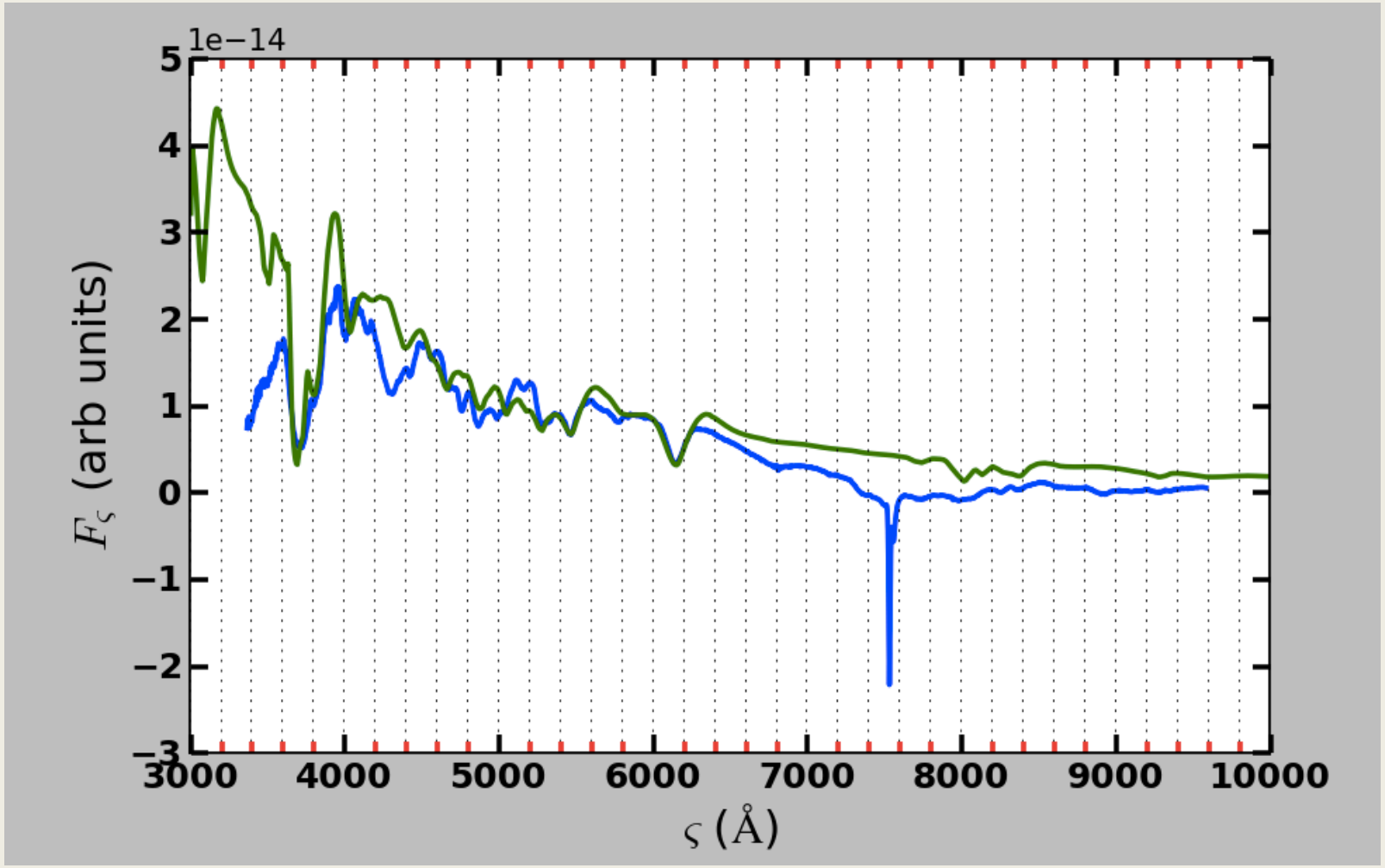
SN 2021fxy

- Using SYNOW (David Branch), we can produce synthesized supernova spectra to match the actual spectra of SN 2021fxy

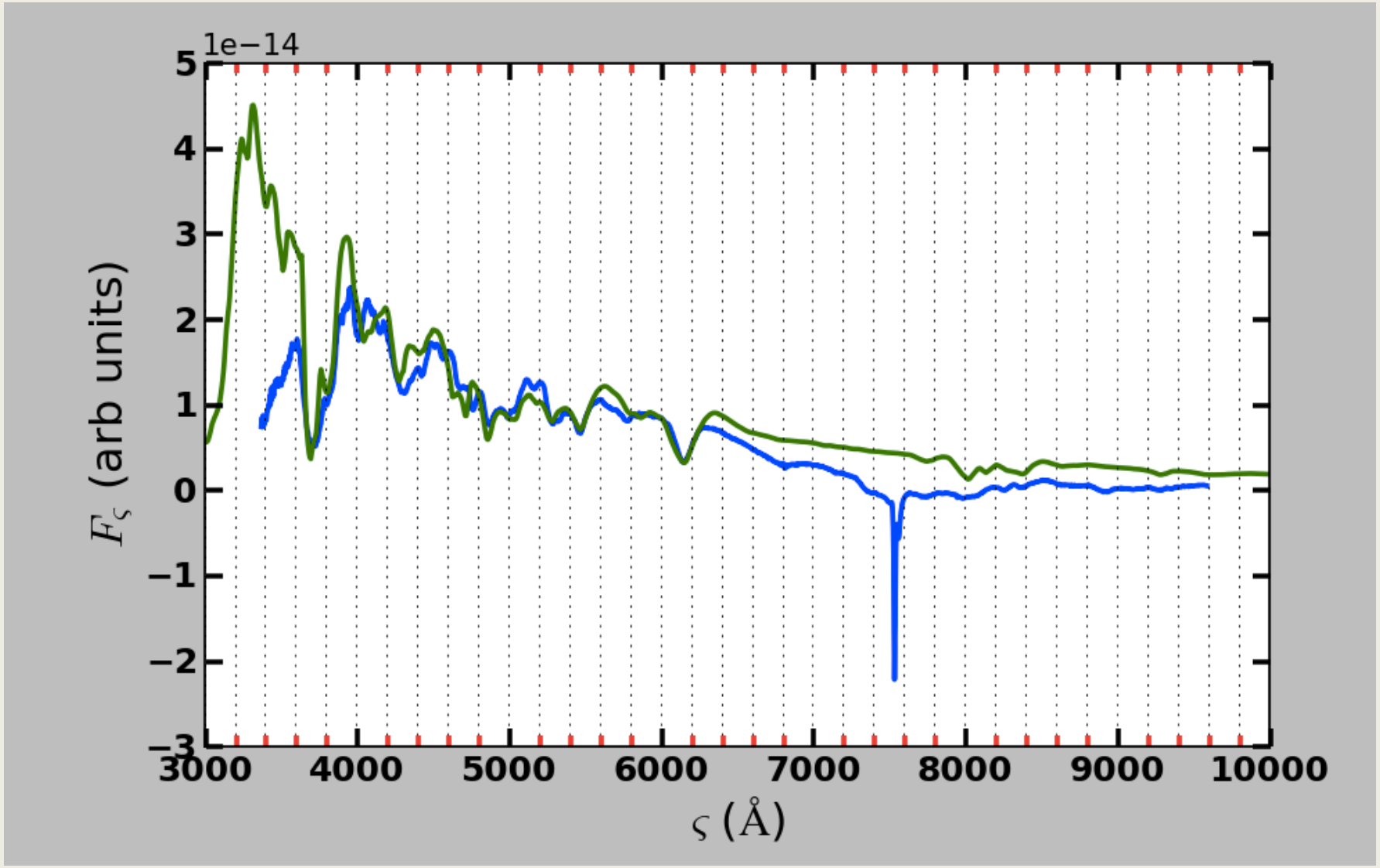




Synthesized spectra (green) plotted alongside actual spectra (blue) with only Si II turned on.



Adding on ionized sulfur, ionized calcium, and ionized high-velocity calcium



Adding on Fe II, high-velocity Fe II, and Fe III