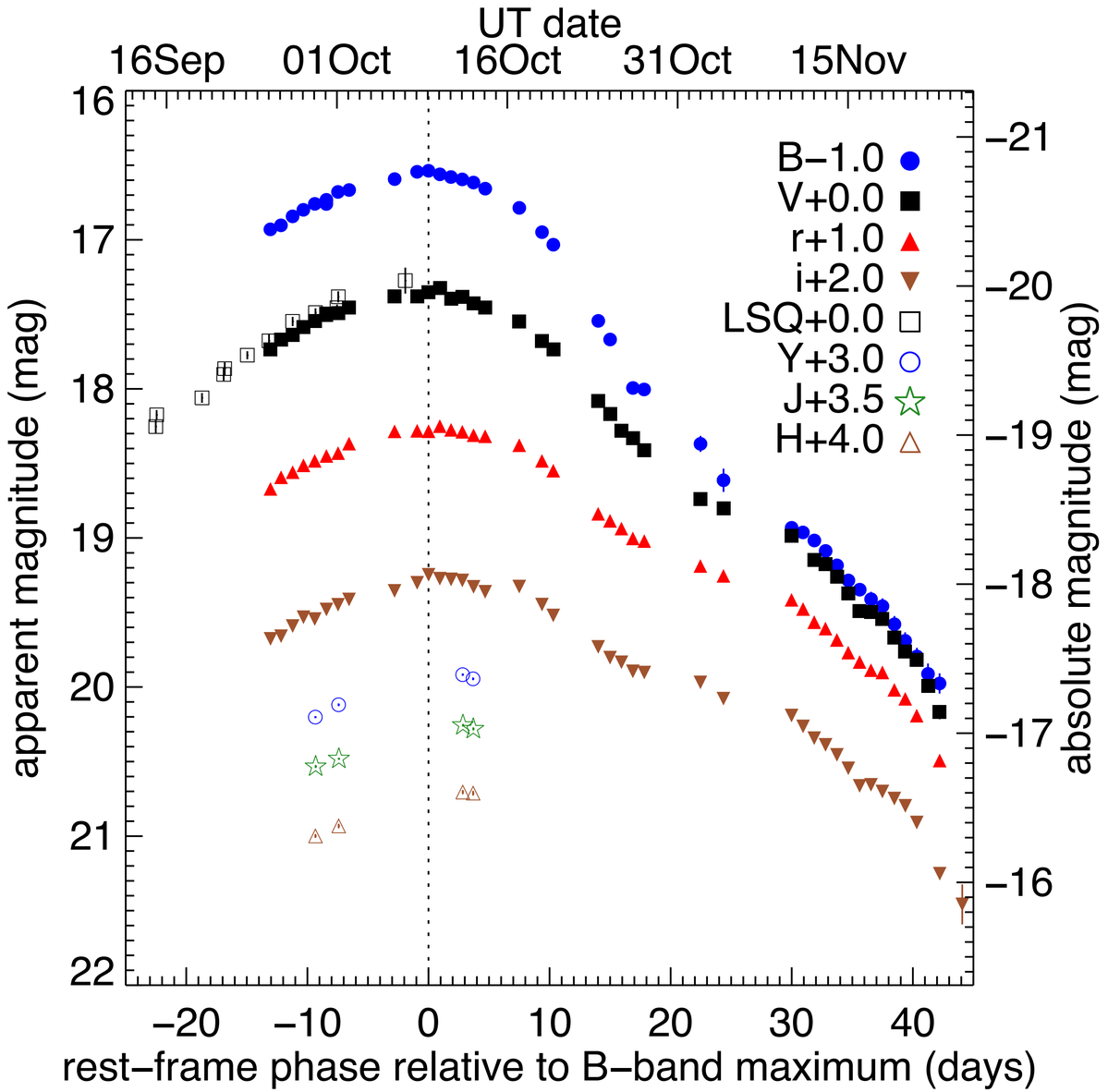
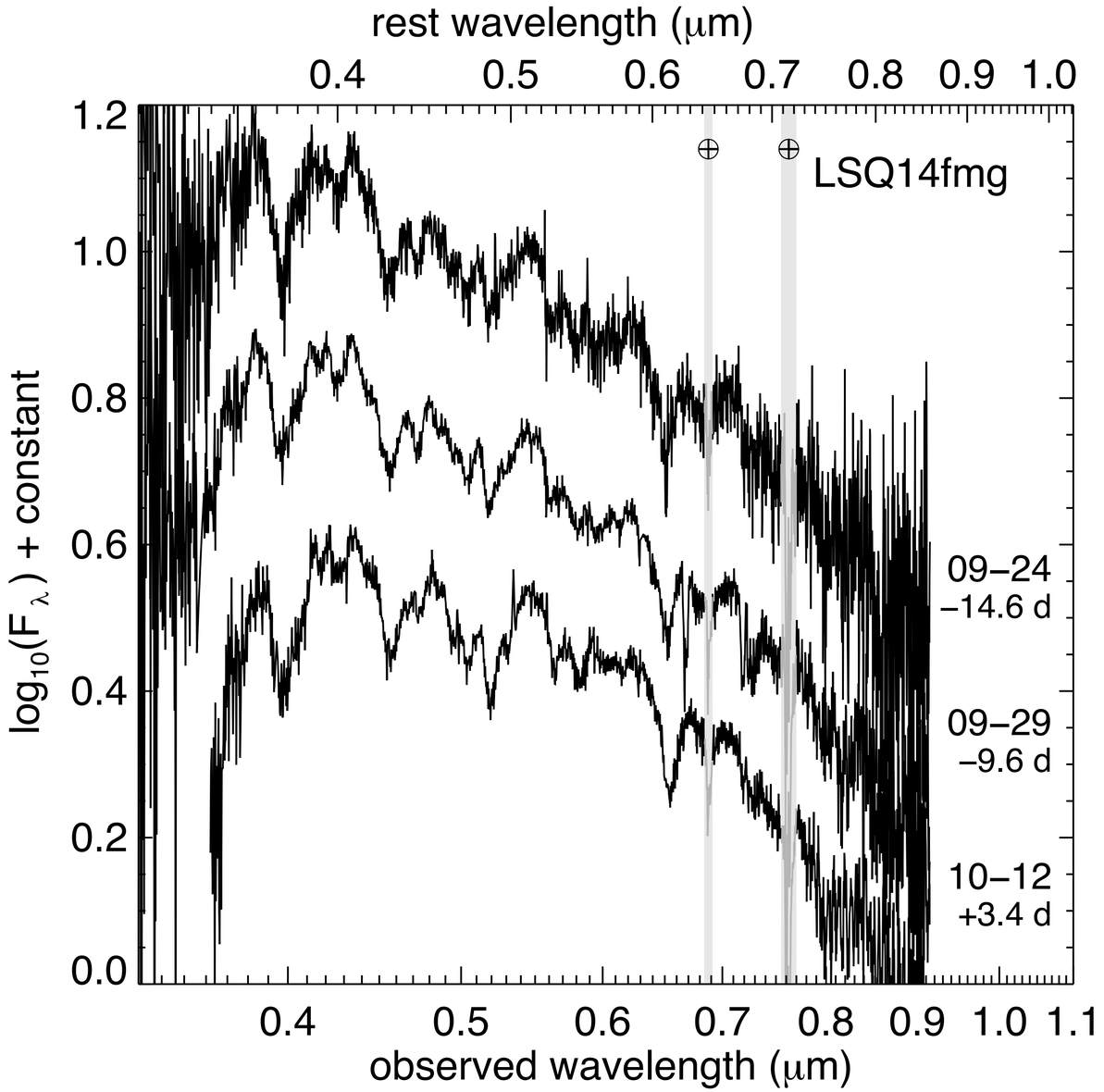
What type of supernova is this?



It is a Type Ia.

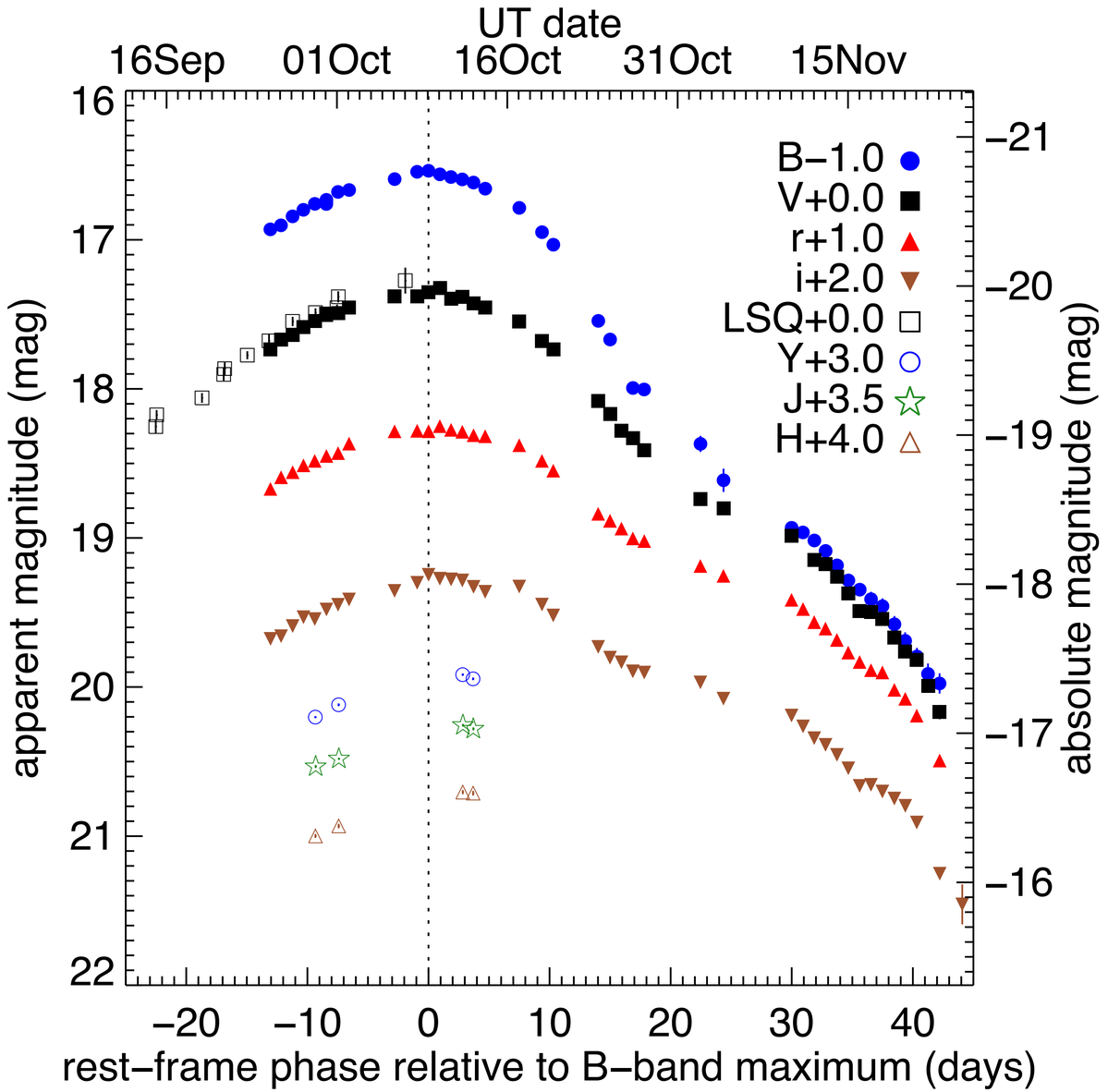
Spectral features changed little from 2 weeks before to maximum light.



LSQ14fmg: a peculiar peculiar object

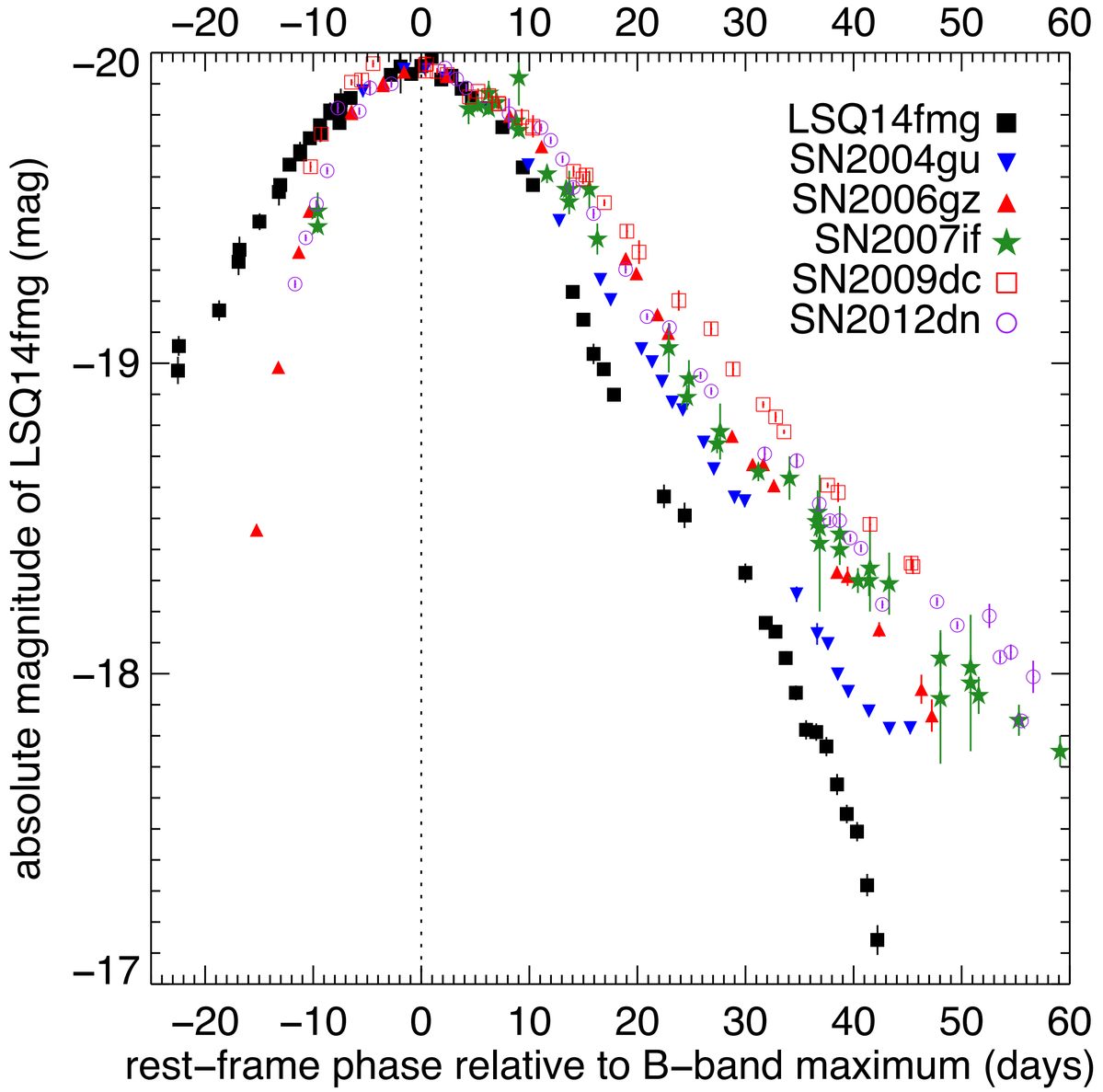
It’s bright!

This with absolute V ~ −20, it should be categorized as a super-Chandrasekhar.



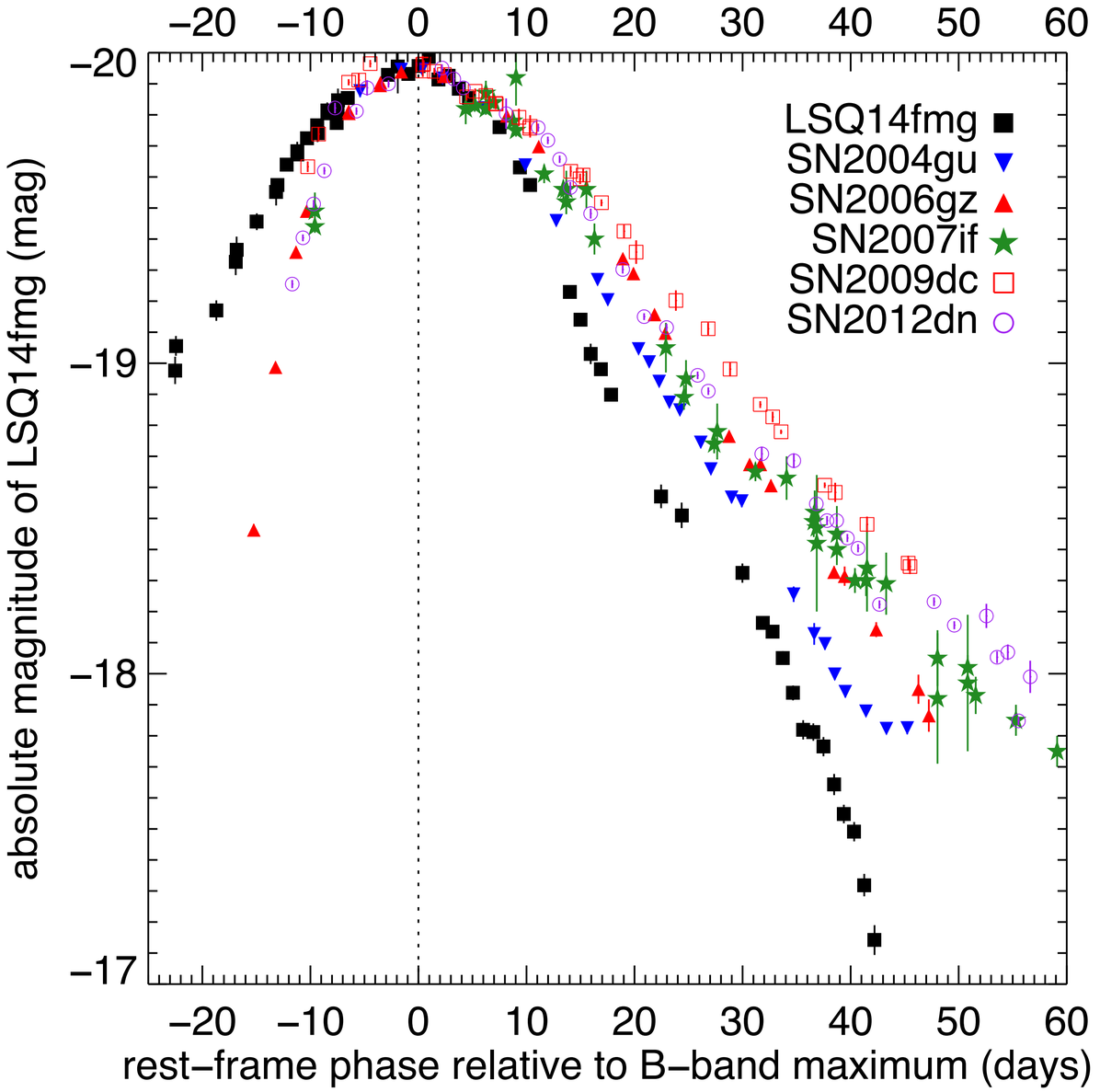
It’s rise is super slow.

The rise is the slowest of all super-Cs. I have yet to find constraining data for the explosion date.



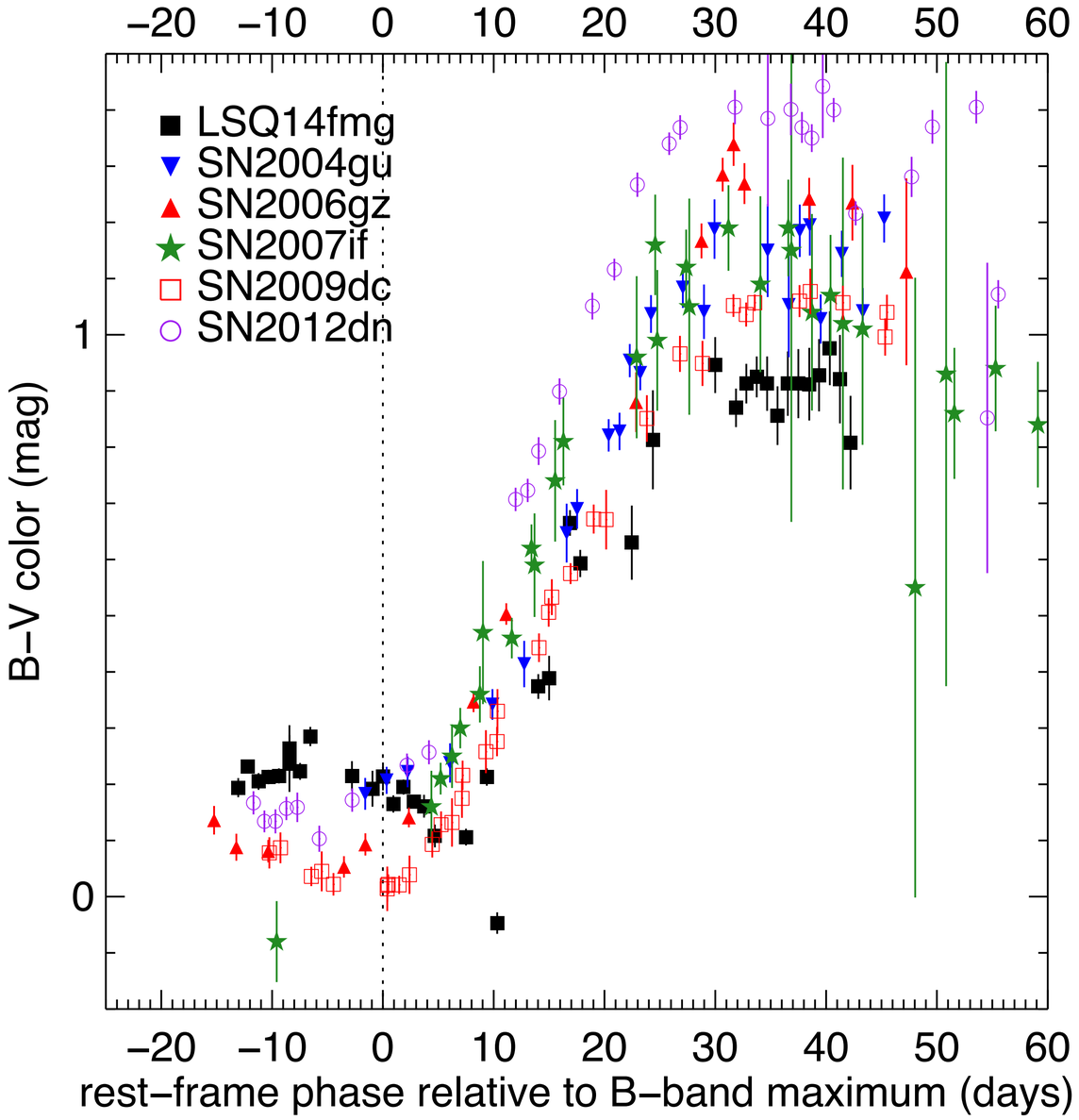
The decline is also weird.

A slow rise should be paired with a slow decline. However, decline for LSQ14fmg is relatively fast, with a rapid drop at the radioactive decay tail.



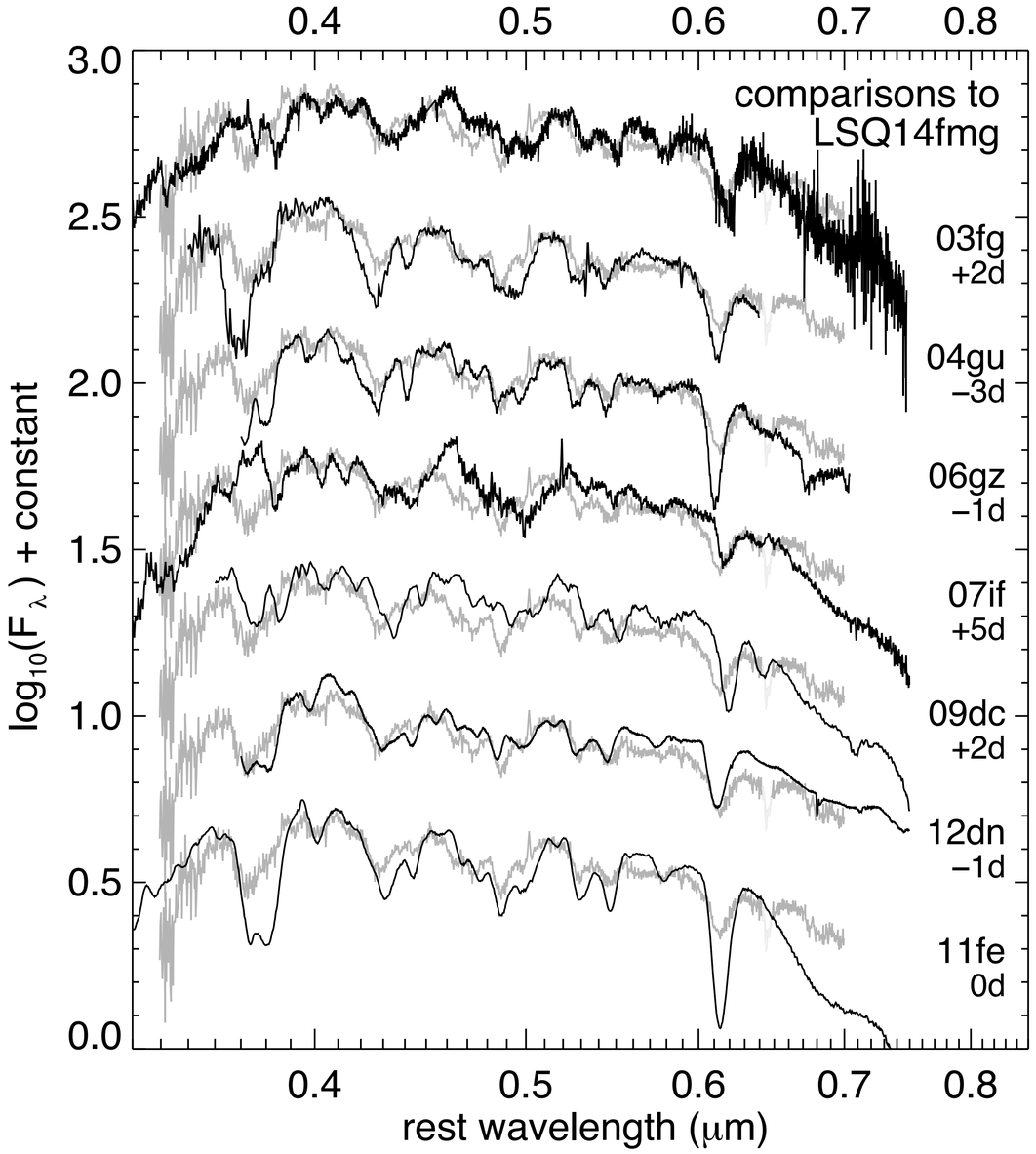
It’s red at peak.

It is the reddest of all super-C’s at peak, but evolves to be the bluest at late time.



Velocity is normal.

Si II 6355 velocity is ~10,300 km/s. It does not have the characteristic low velocity of super-Chandrasekhar events.



Let’s recap.

- It is bright, red at peak, and has slow rise.
  All these points to a massive envelope.

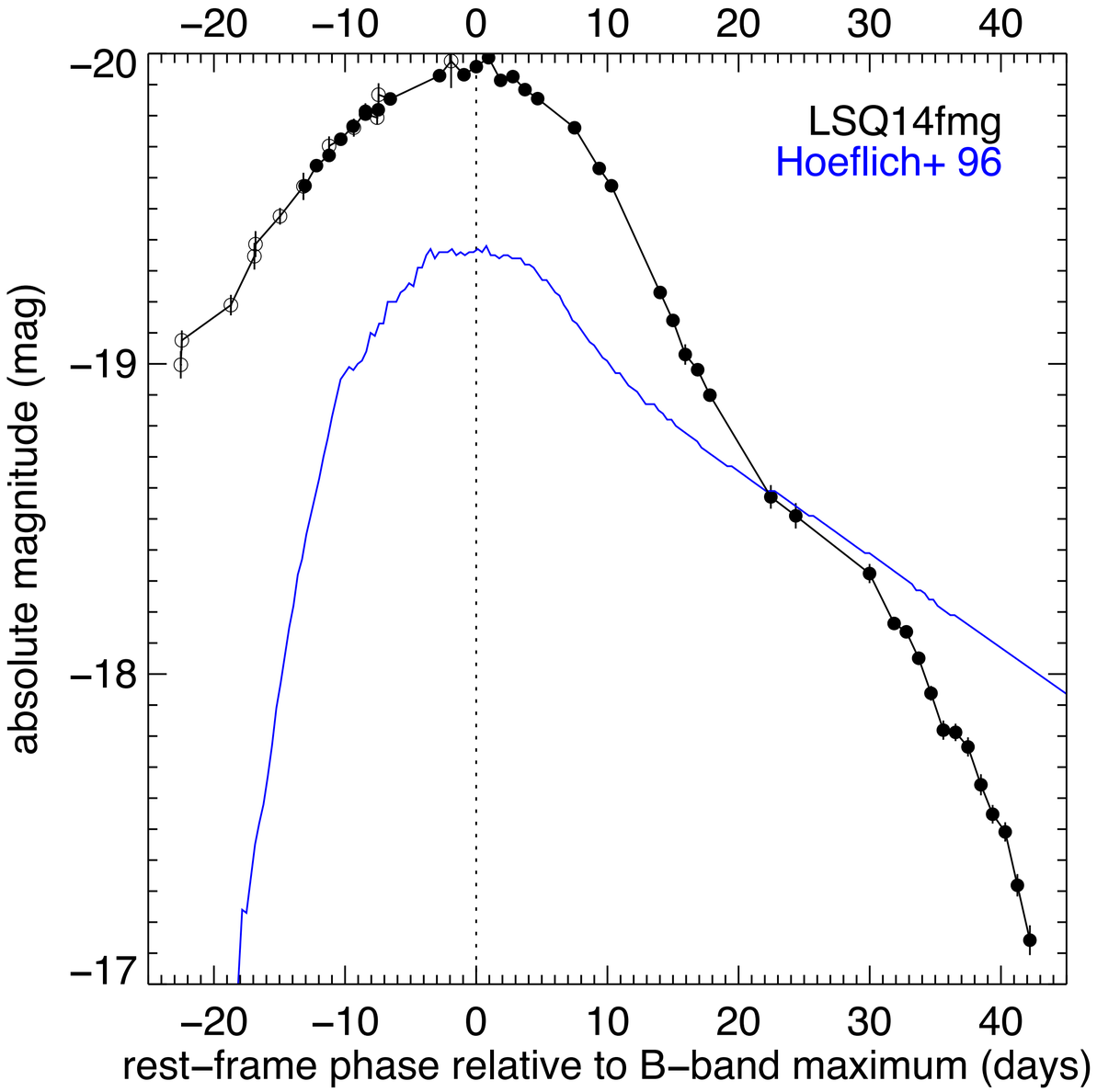
- However, velocity is not slow, so
  the envelope mass cannot be that high.

- What is going on here?

Is there a model for this?

This a comparison with the DET2ENV4 model from Hoeflich & Khokhlov 1996 with 1.2 solar mass white dwarf 0.4 a solar mass envelope.

I stretched the LC width by 30%.



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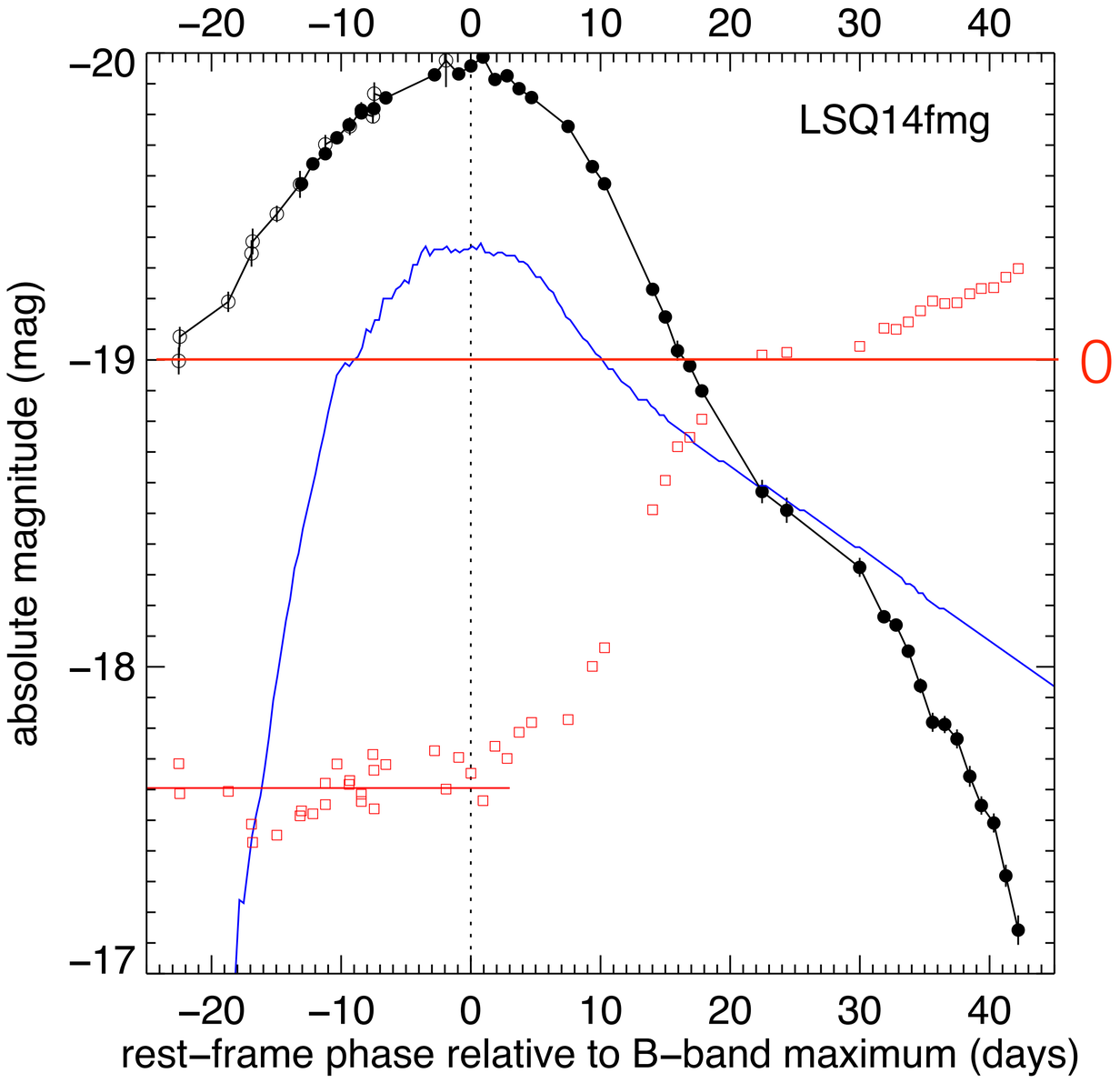
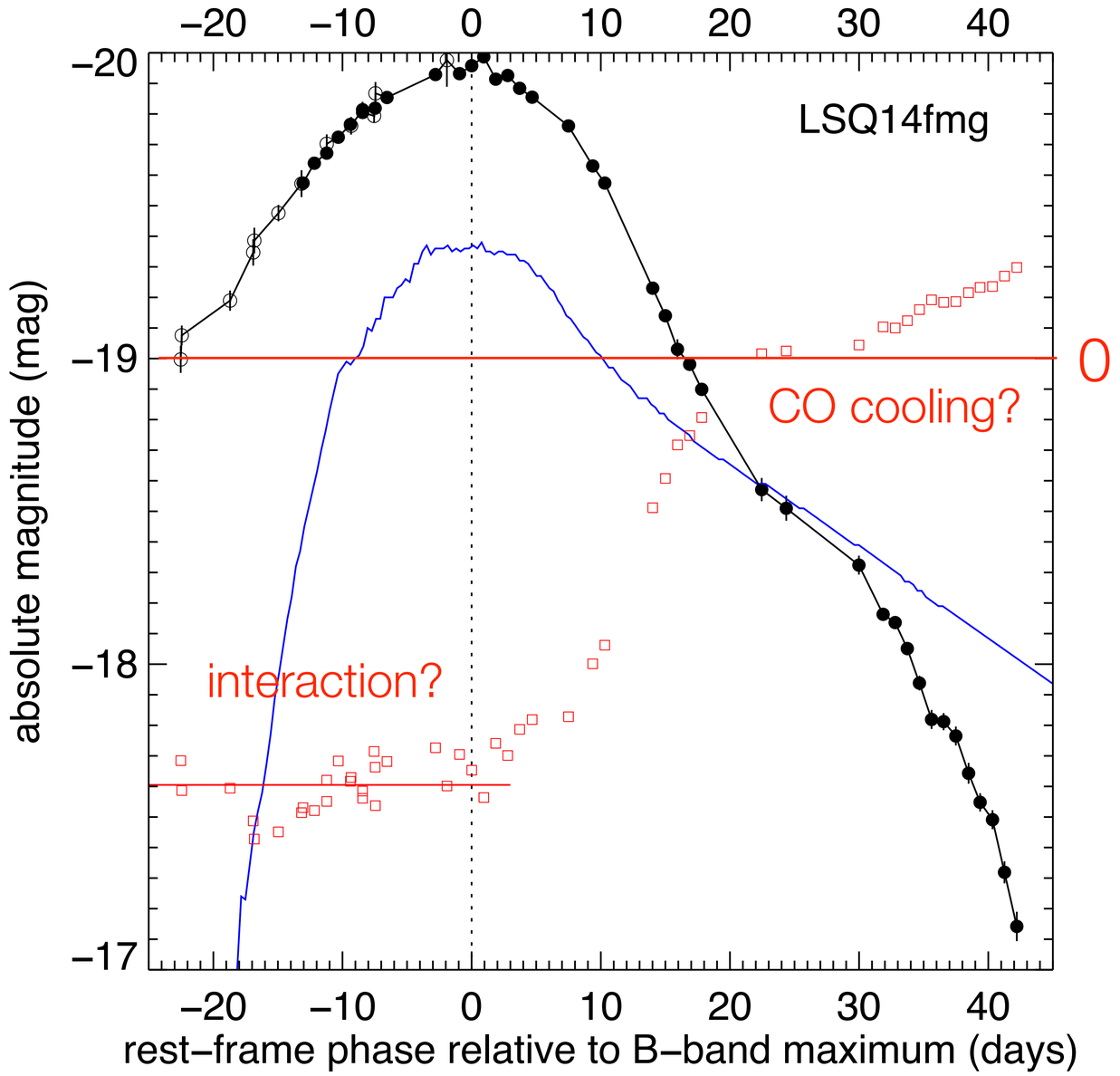


Some speculations.

Consider the core degenerate scenario for super-Cs (Peter's crazy idea), the merger of the core of an AGB star and a companion WD.

LSQ14fmg went off during or soon after an AGB He flash episode. SN ejecta first runs into the AGB envelope, then the less dense and constant mass loss wind.

The envelope structure creates instability and the wind sustains the instability and mixing.



Some speculations.

The generally slow rise, decline, and red color at peak are from the envelope of the AGB star.

The constant excess flux before max comes from interaction with the AGB wind.

Sustained mixing by the wind mixes silicon out, and mixes CO in.