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Modeling non-thermal emission from SN 1987A

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SN 1987A

The circumstellar medium

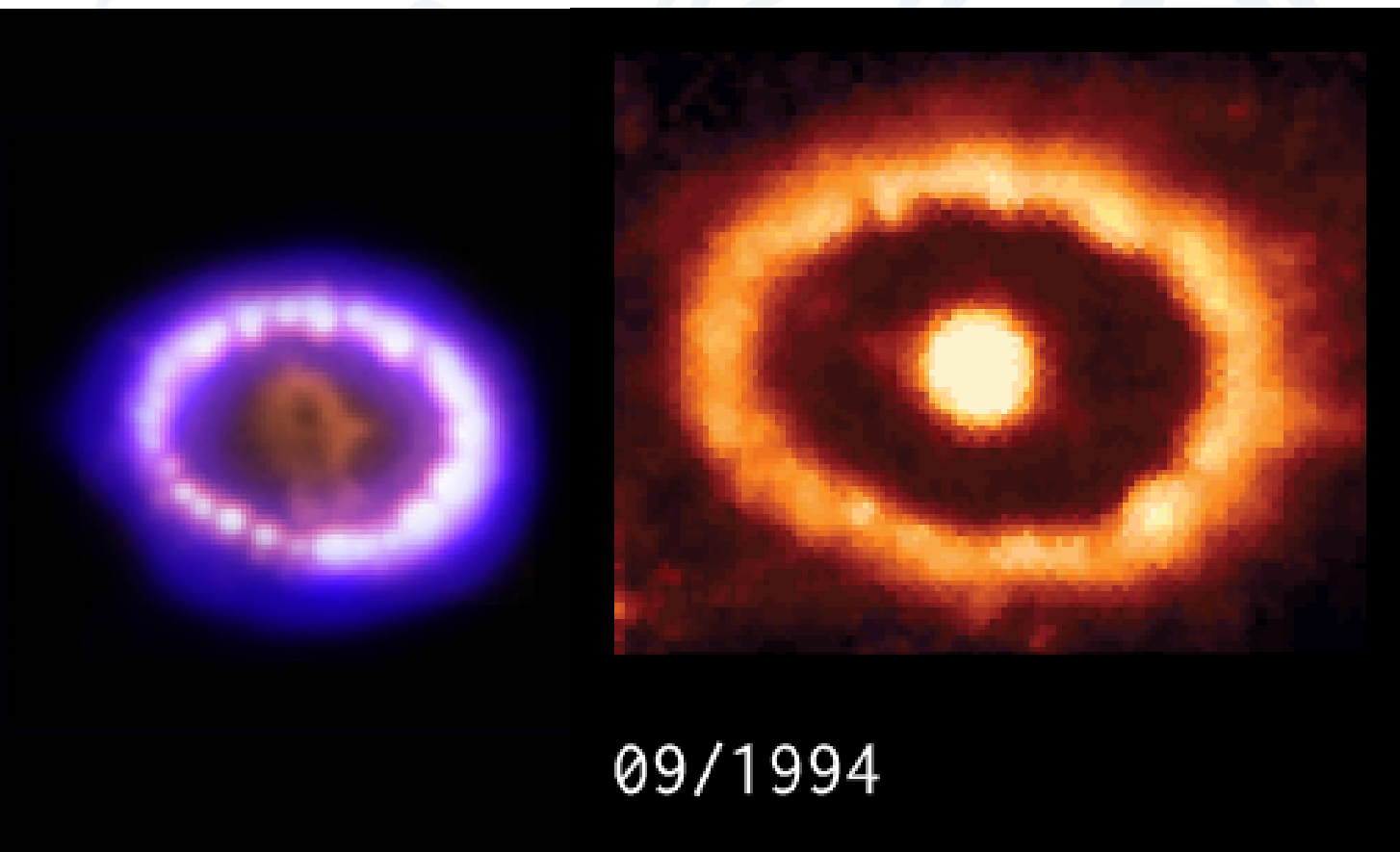
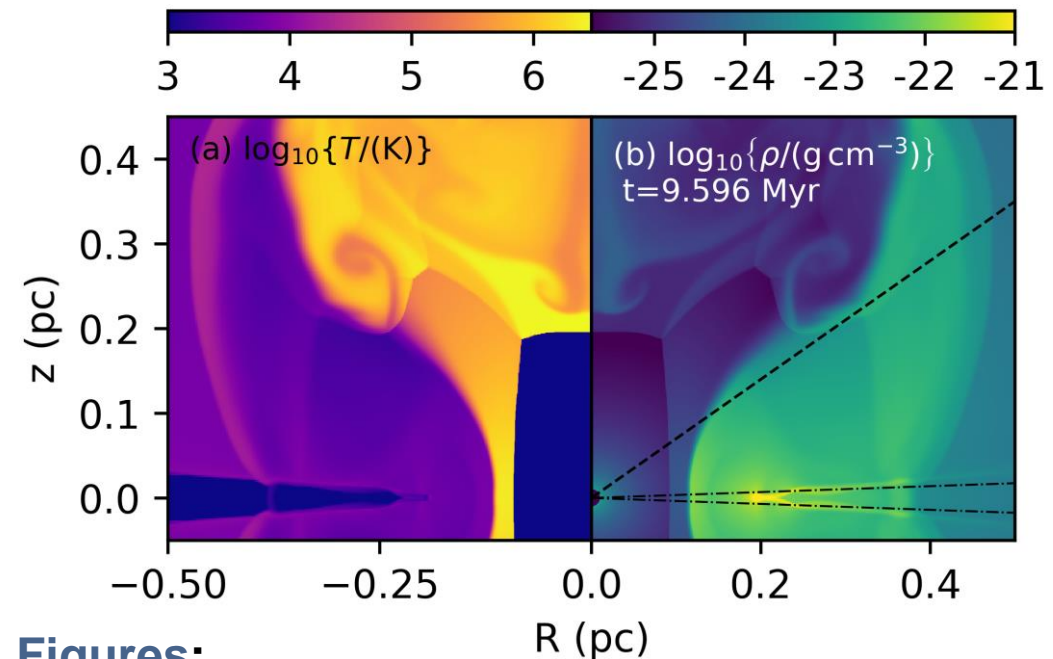


Figure: Optical (left) and X-ray (right) emission from SN 1987A
(Credit: Hubble NASA/ESA)

Modeling non-thermal emission from SN 1987A

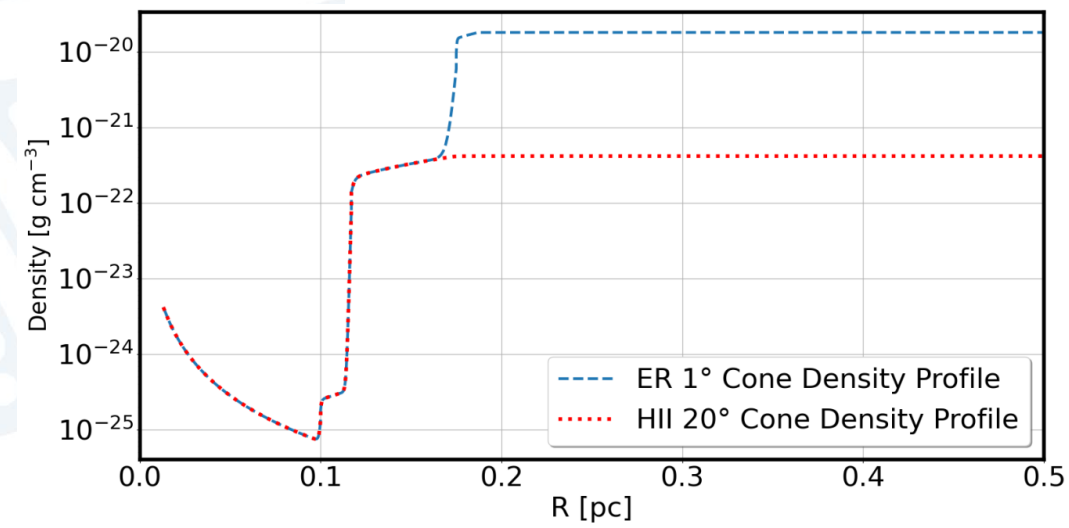
Robert Brose, 37th ICRC, 12-23 July 2021



Figures:

(Top) Ambient density and temperature distribution obtained from 2D-MHD simulations using *PION*

(Bottom) “Toy”-model density distribution around SN1987A using two cones.



SN 1987A

Gamma-ray emission



Radiation Acceleration Transport Parallel Code:

- Kinetic approach to CR-transport
- HD treatment of shock-dynamics
- 1D spherical symmetry

Figure:
Simulated vs. observed gamma-ray spectrum

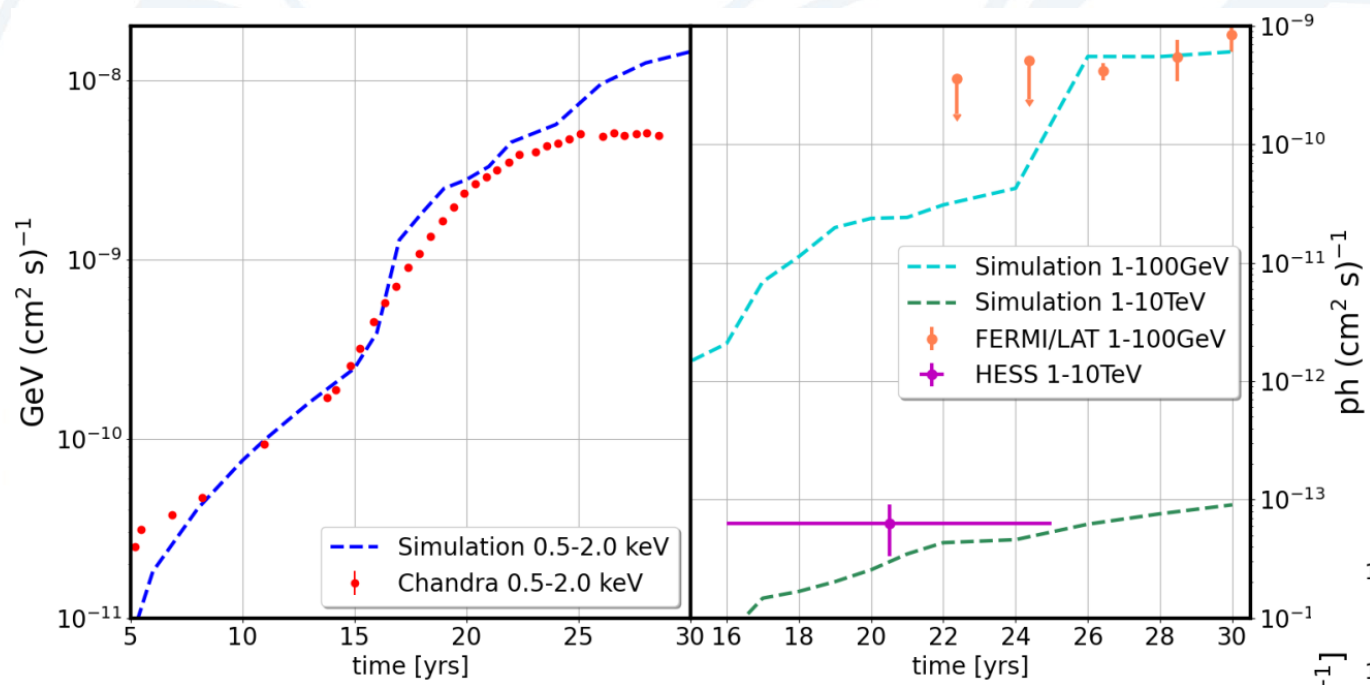
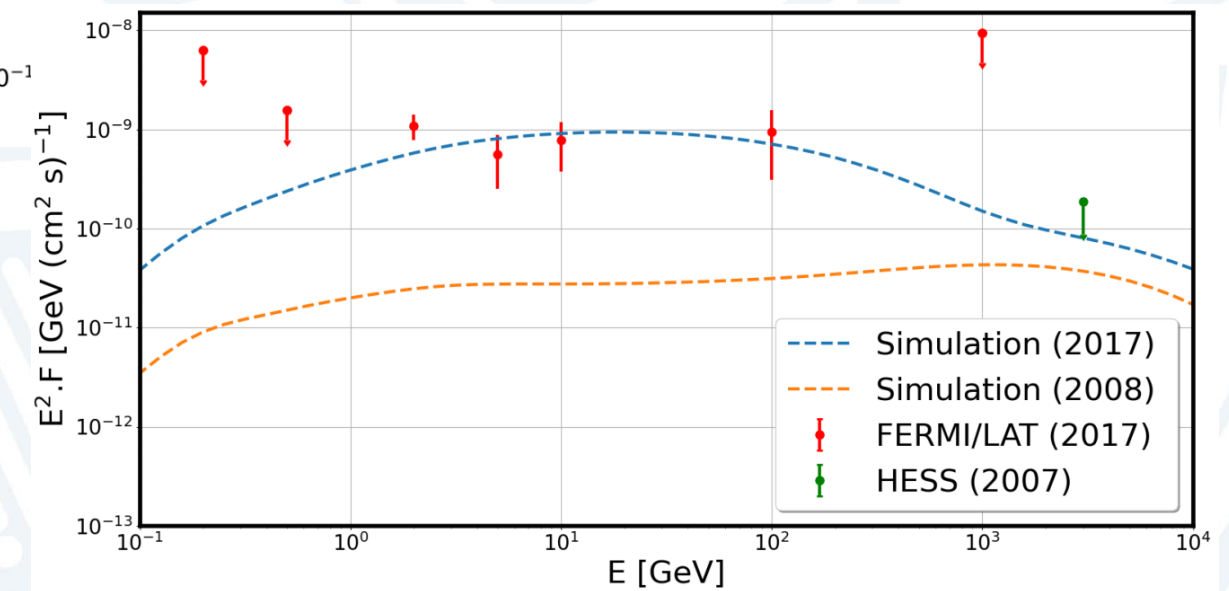


Figure: Left: Simulated vs. observed thermal X-ray flux
Right: Simulated gamma-ray flux vs. observed photon flux



Conclusions:

SN 1987A might be detectable by H.E.S.S. due to brightening since 2010 with a soft $s \sim 2.6$ spectral index above $E > \sim 100 \text{ GeV}$