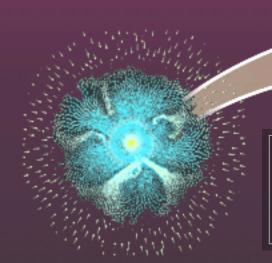
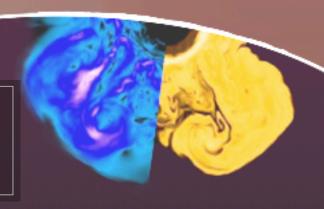
# Understanding Core-Collapse Supernovae



### **CCSN Phase**

Followups / studies

DiagnosticsObservables



#### WHAT WE NEED TO KNOW:

- ✓ Condensed matter
- ✓ Neutrino physics
- ✓ General Relativity
- ✓ Magnetohydrodynamic

- ✓ Plasma Turbulence
- ✓ Nuclear physics
- ✓ Cosmic-ray acceleration
- ✓ Radiation transport
- ✓ Chemistry of Galactic dust

### Phase I – Core collapse

Radio followup (pulsars) X-ray followup (binaries) Multimessenger detections

- Prompt emission Gravitational waves MeV Neutrinos
- Compact remnants
   Mass and spin (through GW, radio and X-ray observations)

### Phase II – Propagation of the blastwave through the star

EM followup for stellar abundance patterns Dust study (in lab and with SN observations)

- Shock breakout UVOIR and X-ray light curves, spectra
- Nucleosynthetic yields
   Galactic dust composition
   Galactic chemical evolution

# Phase III -Propagation of the blastwave through the circumstellar medium

Broad band followup (Radio – gamma-ray)

- Temporal evolution of emitted radiation Light curves and spectra
- Supernova remnant
   Light curves, spectra (lines)
   Imaging of morphology (asymmetric explosions)
   Polarimetry (magnetic fields structure)