**discussion**

Ringberg
25.06.2013

Star formation relations

- Is there a one-to-one relation between gas density and star formation?

- If (really) yes, what does it mean? What does it tell us about the physical processes that govern stellar birth? What does a slope of 2, 1.5, 1.0, or 0.8 tell us?

- What may be the hidden parameters that the typical KS plot does not reveal?

Origin of turbulence

- What drives the supersonic ISM turbulence?

- Can we measure that? How can we distinguish observationally between different mechanisms?

- What are good statistical measures to characterize turbulent flows in the ISM?

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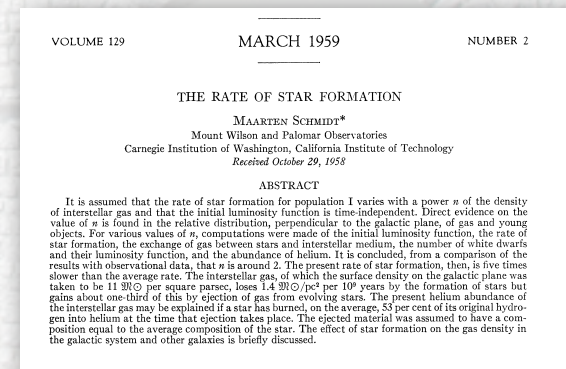
Importance of feedback

- Processes

  - protostellar outflows

  - H2 regions

  - radiation pressure

  - supernovae

- How important is feedback for cloud evolution and dynamics?

  - On what scales / evolutionary phases are they important?

  - Why do SF cloud look identical to non-SF clouds?

- Is SF really self-regulated?
  (accelerated SF vs. slow equilibrium evolution)

SN1987A
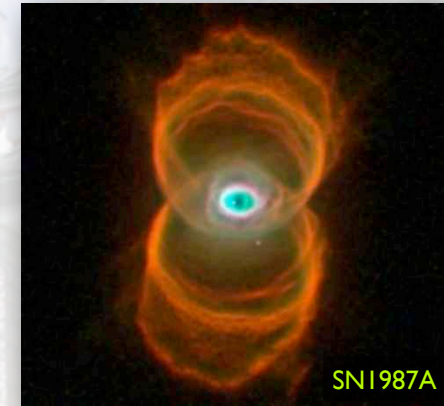
Importance of cooling and heating

- Do we appreciate the importance of the thermodynamics in the ISM sufficiently?

- Dust? Do we understand how dust works? Dust acts as thermostat for high-density gas.

- What are good measures for the age / evolutionary state of clouds?

Energy balance in the ISM

- Competition between may different processes

  - turbulent kinetic energy density

  - magnetic energy density

  - thermal energy density

  - cosmic rays! (largely neglected!)

$$\frac{1}{2}\frac{d^2 I_E}{dt^2} = 2(E_{kin} + E_{int}) - 2(\tau_{kin} + \tau_{int}) + M + \tau_M - W$$
$$-\frac{1}{2}\frac{d\Phi}{dt}$$

$$\frac{1}{2}\frac{d^2 I_L}{dt^2} = 2(E_{kin} + E_{int}) - 2\tau_{int} + M + \tau_M - W,$$

Ballesteros-Paredes (2006)

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Simulations and Observations

- What can we learn from numerical simulations?

- How can we compare models with observational data?

- Do we need every increasing resolution or do we need more physics?

- How can small-scale simulations best provide subgrid-scale models for galactic simulations?

(Zuse Z1 Computer)