Supernova Cosmology - Connections to "usual" physics

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1 Main Goal

Teaching students about measuring cosmological distances in physics.

2 Already present knowledge

- spectrums, absoption lines
- basic Kepler
- wave/particle properties of light

3 Introduction and Connections to already present Knowledge

- use Kepler as a link to introduce binary systems
- outline the evolution of a star
- creation of a Type Ia supernova (maybe supported by a film)

4 Advanced and new Concepts

- flux and luminosity
- absolute and apparent magnitude
- cosmological distances

5 Problems

- currently there is nearly no astronomy taught in schools
- supernova cosmology is a very specific topic
- much knowledge has already to be present
- therefore, it will be difficult to introduce the topic in schools

6 Tasks

The tasks are designed to introduce the students to working with real data and therefore use such.

- You're given a set of luminosity over time curves. Which of these curves represent Type 1a supernovae?
- What is the maximum luminosity of the remaining supernovas? What do you expect? What do you observe?
- Calculate the absolute magnitudes from the luminosities.
- Use the provided set of data (apparent magnitudes) to calculate the distances of the supanovas.
- What unit is most suited to express the calculated distance?
- For which distances can you use this method? What problems arise or are there better methods at other distances?