# Practical round

7. **The Initial Mass Function and supernovae.** The evolution of a single star depends solely on its mass, therefore mass is the most important parameter of stars. It is believed that the distribution of stars by mass at the time of their birth (also known as Initial Mass Function, IMF) is universal.

***Figure 2.*** *The Initial Mass Function (IMF) in logarithmic scale, according to two different models. The observational data is shown in equally sized bins, with error bars. The y-axis shows the relative number of stars (ΔN/ΔlgM) with a given mass.*

**7.1.** The star formation rate in our galaxy is $\Delta M/\Delta t = 8\ M_\odot$ / year. Stars born with mass greater than $8M_\odot$ explode as core-collapse supernovae. Estimate the core-collapse supernova rate in the galaxy. (Or: how often do core-collapse supernovae explode in our galaxy?)

***Hint:*** *What is the average initial mass* $\boldsymbol{M_{SN}}$ *of a core-collapse supernova? What fraction* $\boldsymbol{q}$ *of the total star formation mass goes into supernovae (0<q<1)? Find the answers to these questions by doing measurements on the IMF figure (Fig.2).*

**7.2.** What is the frequency $f$ [$yr^{-1}$] of directly observed supernovae in the Milky Way? If there is a significant difference to your result from 7.1., provide an explanation by drawing schemes and, if necessary, by including a very short text (not more than 20 words).

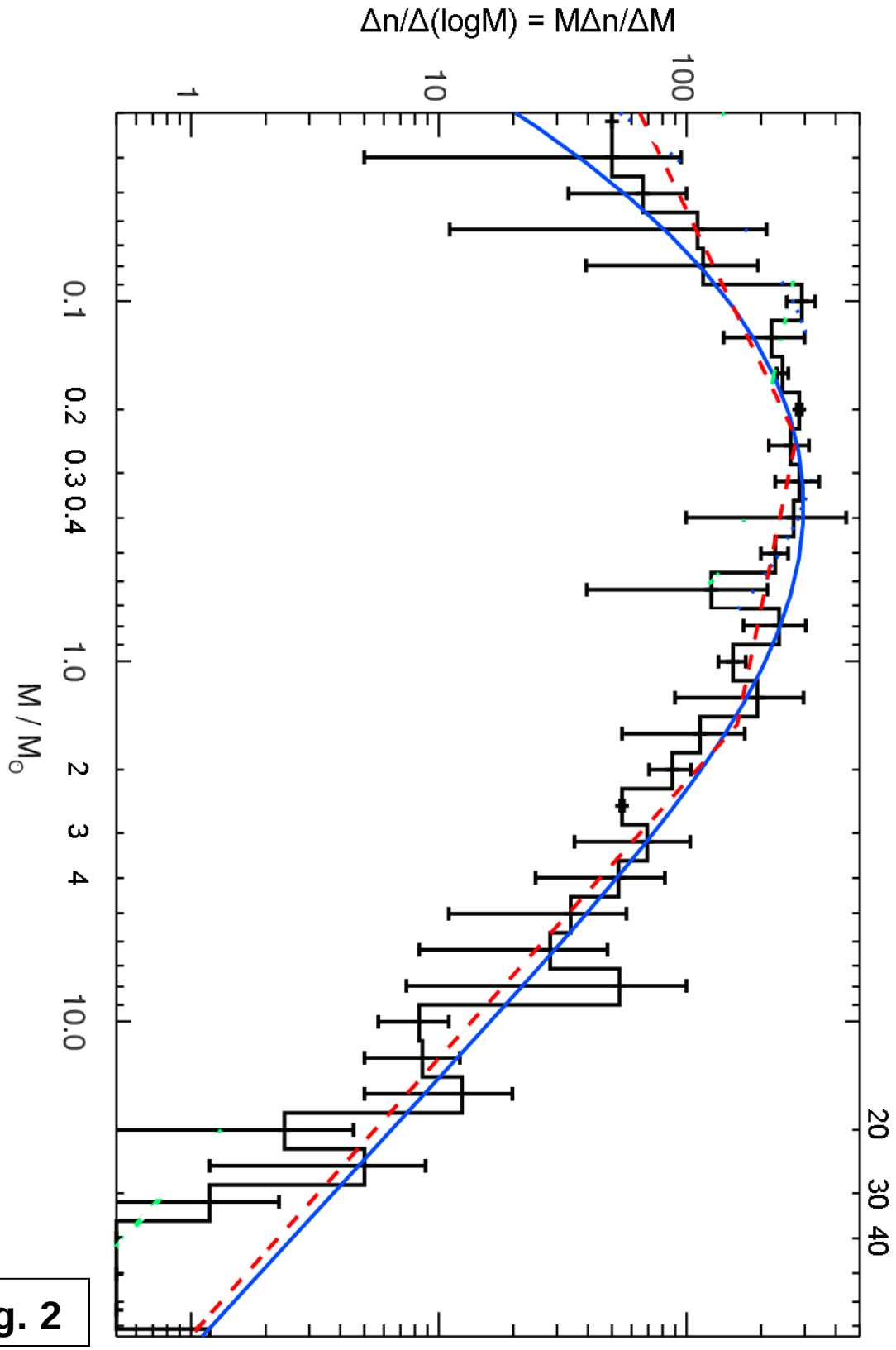


Fig. 2