# Modern physics Exercises Chapter 14

14.2.1  In the figure in Chapter 14.7 one sees the galaxy Ursa Major II. Measure the distance to the galaxy and use Hubble's law to calculate how fast it moves relative to the Earth.

Answer: $2.10 \times 10^7$ m/s

14.4.1  Cepheid stars are used to calculate intensities. It is directionally proportional against the pulsating time. For a Depheid the pulsation was 10 days. Use the figure to determine the luminosity in the unit $L_{sun}$.

Answer: $2.0 \times 10^3 \ L_{sun}$

14.8.1  The red shift of stars and galaxies can be described by the parameter z. Calculate how fast a galaxy is moving away from Earth if $z = 3.5$.

Answer: $0.906c = 2.72 \times 10^8$ m/s

14.8.2  Suppose a galaxy is moving at 0,8 c. Clculate the red shift parameter z.

Answer: $z = 2$

14.11.1  A Black hole has the mass of 70 Solar masses (The Solar mass is $1.989 \times 10^{30}$ kg). Calculate the Scwarzschild radius.

Answer: 210 km

14.12.1  Determine the temperature for the same Black hole.

Answer: $8.9 \times 10^{-10}$ K

14.13.1  Determine the lifetime of a small Black hole with mass $10^{11}$ kg, just like a big mountain.

Answer: 80s