general relativity – november 8

material discussed in class

Roughly 7.1,7.4,7.5,7.6 in the book, or pp 142-163 of the lecture notes.

exercises

- Consider a system of particles moving in a plane with common angular frequency ω. Assume the i^{th} particle is located at time zero at position $(r_i \cos\phi_i, r_i \sin\phi_i)$ in the plane. Show that the average total emitted power is given by

$$\left\langle \frac{\partial E}{\partial t} \right\rangle = -\frac{32 G \omega^6}{5} \sum_{i,j} m_i m_j r_i^2 r_j^2 \cos 2(\phi_i - \phi_j).$$

- Consider a bar with length one meter, with a mass of one kilogram at each endpoint. Assume this bar rotates once a second. Compute the power emitted due to gravitational radiation. Remember $c = 1$ in our units.