442 Tutorial Sheet 7[1]

8 March 2005

1. (3) Find the Robinson-Walker solution with positive cosmological constant and no matter for all three values of k.

2. (2) The *particle horizon* is the radius of the sphere of all particles that could be seen by us. It is the maximum straight line distance that could have been travelled by a light ray since the begining of the universe. Obviously, in a static universe this would be t_0. What is is for a $k = 0$ dust universe?

3. (2) What is the particle horizon for an inflating universe.

4. (1) Find an integral formala for the age of the universe with general k and $\Lambda \neq 0$. This integral is elliptic and can be integrated explicitely in terms of elliptic functions. This is not required here.

5. (3) Calculate the leading order correction to the age of a dust universe with $\Omega_0 = 1 + \epsilon$ and $\epsilon > 0$. We previously looked at $\Omega_0 = 1 - \epsilon$.

[1] Conor Houghton, houghton@maths.tcd.ie, see also http://www.maths.tcd.ie/~houghton/442.html