

FYS4630/FYS9630

Assignment #5

- 1) Show that the l 'th moment of a phase function is:

$$\chi_l = \frac{1}{2} \int_{-1}^1 du P_l(u) p(\tau, u)$$

Hint: Use the Legendre polynomial expansion of the the phase function:

$$p(\tau, u) = \sum_{l=0}^{\infty} (2l + 1) \chi_l(\tau) P_l(u) \text{ where } u = \cos \Theta$$

and the orthogonality property:

$$\frac{1}{2} \int_{-1}^1 du P_l(u) P_k(u) = \frac{1}{2l + 1} \delta_{lk}$$

- 2) Find all moments of the Rayleigh phase function

$$P_{Ray}(\cos \Theta) = \frac{3}{3 + f} (1 + f \cdot \cos^2 \Theta)$$

- 3) Show that the zeroth moment for any phase function is $\chi_0 = 1$