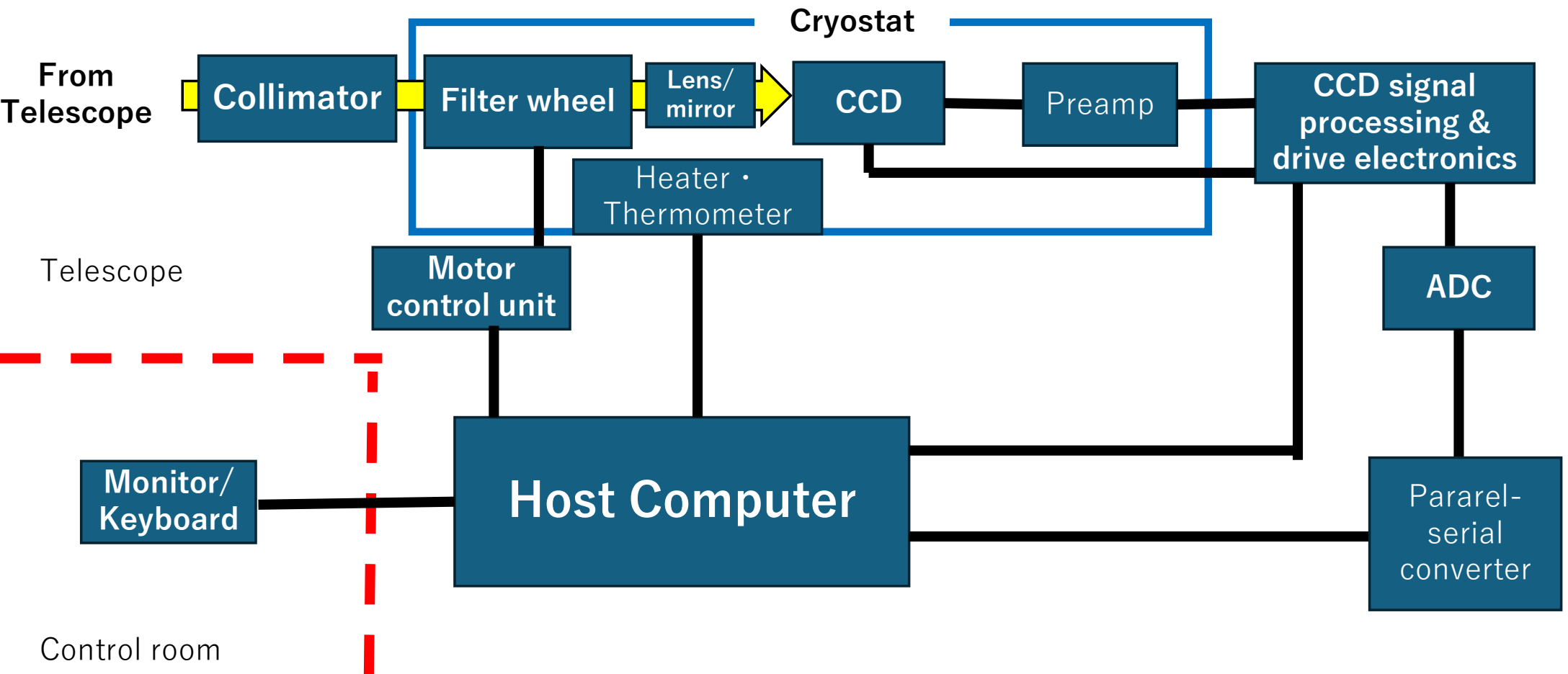**1** Draw a block diagram layout of a cooled CCD camera system with a filter wheel which is to be used on a small telescope and remotely controlled from a "warm room" 15 m away using a PC computer.

7 (a) Calculate the diffraction limit for an $f/2$ lens with a focal length of 50 mm at a wavelength of 500 nm in the mid-visible. (b) The depth of focus is the amount of defocus which introduces $\pm\lambda/4$ wavefront error; $\Delta f = \pm 2\lambda(f/\#)^2$. Determine the depth of focus for the lens in part (a).

(a) Diameter(D): $2 = \dfrac{50(mm)}{D} \Rightarrow D = 25(mm)$

Diffraction limit: $2.52 \times 10^5 \times \dfrac{500(nm)}{25(mm)} = 5.04(arcsec)$

(b)

$$\Delta f = \pm 2 \times 500 \times 10^{-9} \times 2^2 = 4 \times 10^{-6}(m) = \pm 4(\mu m)$$

許容錯乱円
Permissible circle of confusion

焦点深度 Depth of focus