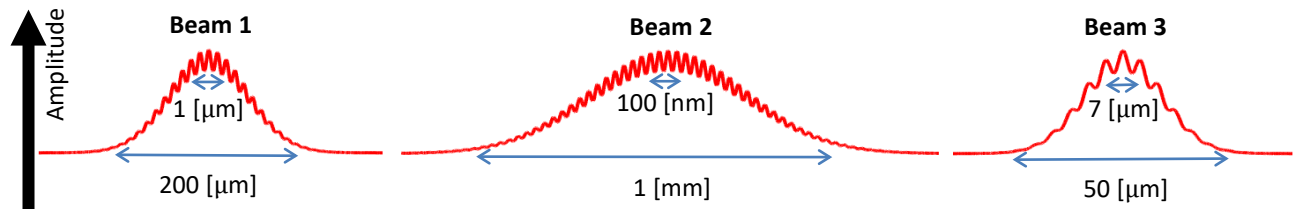


## Quiz 06: Fresnel approximation

- 1) Consider three beams with the shown amplitude profiles. All of the beams are monochromatic with the vacuum wavelength of 600 nm and are propagating in vacuum. The propagation of which beam can be best described within the Fresnel approximation? [2 points]



- 2) A monochromatic beam of wavelength  $\lambda$  has an angular spectrum of  $U_0(\alpha, \beta)$  at  $z=0$ . What condition should be satisfied so that its propagation in vacuum along the  $z$ -direction can be described well within the Fresnel approximation? [3 points]
- 3) The exact transfer function for the propagation of the beam in (b) is  $H(\alpha, \beta; z) = \exp\left(i\sqrt{k^2 - \alpha^2 - \beta^2} z\right)$ , where  $k = 2\pi / \lambda$ . What is the corresponding transfer function  $H_F(\alpha, \beta; z)$  in the Fresnel approximation? [5 points]

You have 10 minutes!

Make sure that you indicate your name and seminar group on your answer sheet.