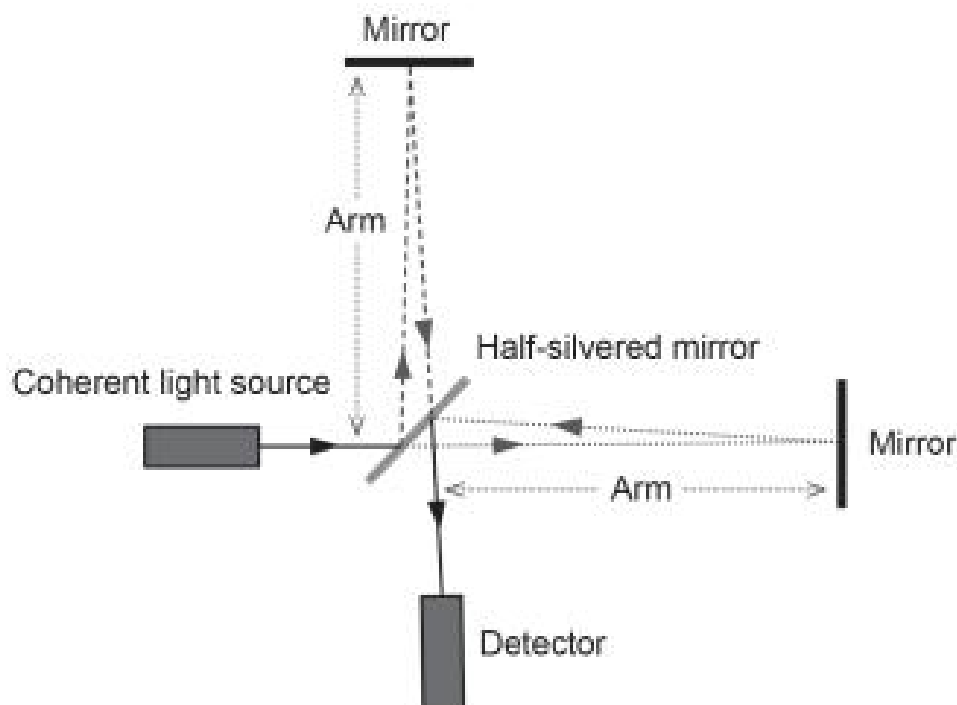


Question 11**(5 marks)**

An interferometer is a device that splits a single beam of laser light into two and sends the two separate beams in two perpendicular directions. The beams are reflected at the ends of their separate paths, return and are recombined to form an interference pattern at the detector.



- (a) The laser used in an interferometer is a near infra-red, 808 nm laser. If the two reflected beams are initially in phase and the interference pattern changes to produce perfect destructive interference (180° out of phase) due to a change in length of one of the arms, calculate the change in length of the arm. (3 marks)

Answer _____ m

This device is used to detect gravitational waves. As a gravitational wave passes through the interferometer, it creates a small change in length of one or both arms.

- (b) An interferometer, with 4 km long perpendicular arms, recently detected gravitational waves. Describe how the direction of the gravitational wave relative to the interferometer would affect its detection. (2 marks)
