

## Question for groupwork

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**(1) Design an experiment that allows you to measure simultaneously the AM and FM modulation, that means both  $V_1(\Omega)$  and  $V_2(\Omega)$ , of an optical beam.**

**Can such a device be built ?**

**(2) Show that a series of beam splitters with the transmissions  $\eta_1, \eta_2, \eta_3, \dots$  can be represented by one single beamsplitter with the transmission  $\eta_T$  given by the product  $\eta_T = \eta_1 \eta_2 \eta_3 \dots$**

**(Hint: start with just 2 beamsplitters)**

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- (3) Imagine you want to measure the position of a laser beam, the location of the centre of the beam. Is there a quantum noise limit to this ? Why ? Can we use squeezed light to avoid this noise limit ?**
- (4) What does it take to show that two laser beams are entangled. Can we do this with detectors that are not perfect ?**
- (5) Name a few other ways of measuring the phase of light, apart from a homodyne detector. Do they have the same technical advantages and limitations ?**