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## **Tissue characterization with ballistic photons: counting scattering and/or absorption centres**

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### Abstract:

We describe a new method to separate ballistic from the scattered photons for optical tissue characterization. It is based on the hypothesis that the scattered photons acquire a phase delay. The photons passing through the sample without scattering or absorption preserve their coherence so they may participate in interference. We implement a Mach–Zehnder experimental setup where the ballistic photons pass through the sample with the delay caused uniquely by the sample indices of refraction. We incorporate a movable mirror on the piezoelectric actuator in the sample arm to detect the amplitude of the modulation term. We present the theory that predicts the path–integrated (or total) concentration of the scattering and absorption centres. The proposed technique may characterize samples with transmission attenuation of ballistic photons by a factor of  $10^{-14}$ .