Purpose: Optically stimulated luminescence detectors (OSLDs) are quickly gaining popularity as passive dosimeters, with applications in medicine for linac output calibration verification, brachytherapy source verification, treatment plan quality assurance, and clinical dose measurements. With such wide applications, these dosimeters must be characterized for numerous factors affecting their response. The purpose of this study was to examine the angular dependence of the nanoDot OSL dosimeter, which is part of the InLight series from Landauer, Inc.

Methods: Relative dosimeter response data were taken at several angles in 6 and 18 MV photon beams, as well as in clinical proton beams. These measurements were done within a phantom at a depth beyond the build-up region. Measurements were conducted over several sessions to provide confidence in the data. To examine the reasons for the observed angular dependence Monte Carlo simulations were performed with MCNPX.

Results: In photon beams, the nanoDot had an angular dependence of 4% at 6 MV and 3% at 18 MV respectively, at angles where the dosimeter was parallel to the beam. Monte Carlo simulations at 6 MV showed similar results to the experimental values. In proton beams, no angular dependence was found.

Conclusions: A significant angular response of this OSLD was observed in photon beams. This factor must be accounted for when evaluating doses from photon beams impinging from non-normal directions.