# A Proposed Design of Collimator and Crystal for Single Photon Detection in Breast Cancer Imaging

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## Abstract

Monte Carlo simulation of collimator and crystal has performed for the design of discrete gamma camera for breast tumor imaging. The purpose of simulation is to induce specific design parameters for collimator, crystal and optical bonding material between collimator and crystal. From the induced parameters we can estimate the performance of the detector of the gamma camera and suggest its accuracy for practical use in the field. The geometry of the collimator should be matched to the crystal geometry in case of discrete gamma camera. The performance of the collimator is a main factor in determining the overall imaging performance For design and simulation, collimator hole of 3mm×3mm, 0.25mm septal thickness of square type Tungsten collimator corresponding to the pixilated photosensor, and a fixed location of breast tumor 25mm from the collimator surface in the phantom have been fixed in this study. For more detail drive of design parameters we varied collimator height, crystal height, crystal surface treatment, and bonding material between crystal and photosensor. We also analyzed geometric efficiency and spatial resolution compared to general theoretical formulation, and indicated their accuracy for realistic several tumor sizes.