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Technology Development of LGADs at FBK

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Low Gain Avalanche Detectors (LGADs) are silicon sensors with internal charge gain. The gain feature is used to improve the signal to noise ratio of the detector. These sensors are finding different applications including timing for high energy physics, beam monitoring for hadron therapy, and soft x-ray detection. This talk details the optimization of LGADs for different applications, with an emphasis on the radiation hardness and soft x-ray detection aspects. A feature of LGADs is the presence of a termination structure between regions with gain. This results in regions without gain between the readout channels reducing the fill factor of the devices. Different strategies to improve the fill factor of LGADs are being developed, such as double-sided LGADs, resistive AC-coupled LGADs, and trench isolated LGADs. The development and results obtained with these technologies are shown and discussed in the talk.

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