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Innovative TCT studies on the breakdown of UFSD3 sensors by FBK

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The third production of Ultra-Fast Silicon Detectors (UFSD3) was recently completed by Fondazione Bruno Kessler (FBK) in Trento.
This new production features pads and strips arrays with 4 different strategies of the gain implant termination, ranging from an inactive area comparable to UFSD2 production to a configuration with a much narrower width. This choice allows studying the impact of the inactive region width on the sensor properties.
In my contribution, I will present the laboratory measurements performed in the Torino Silicon Lab (INFN – University of Torino), aimed at studying in detail the breakdown voltage of UFSD3 sensors and its dependence on the width of the inactive area.
In particular, I will focus on the results achieved using a state of the art CCD camera and employing the Transient Current Technique (TCT) in an innovative way, which gave us a new tool for mapping the sensors hot spots.
Finally, I will report on the observation of micro-discharges occurring both in irradiated and un-irradiated UFSD3 sensors.

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