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ARCADIA fully depleted MAPS sensor first test-beamresults

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The INFN ARCADIA collaboration developed a fully depleted MAPS sensor as technology demonstrator aimed at next-generation experiments and applications in both e the space and medical field. Realized in LFoundry 110nm technology node, the ARCADIA sensor embeds a custom backside process to extend the depleted volume to the entire high-resistivity substrate, down to nanometers from the back surface, while maintaining a very good field uniformity and termination smoothness.

The fully depleted volume, with an overall thickness up to 200 um (but thinner substrates have been implemented as well) makes it suitable for low-energy X-ray detection, as well as near-UV imaging thanks to the very shallow insensitive layer at the back. The readout architecture, capable to handle a rate up to 100 MHz cm², has been optimized for low power consumption, including a "space mode"for very low power operations.

Characterization has been carried out with table-top setup (radioactive sources and x-ray machine) and at test beam with Minimum Ionizing Particles, with a custom-made three layers telescope. Results on sensor performance and tracking resolution are discussed, together with possible applications and future developments.

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