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The vertexing challenge at FCC-ee

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Following in the footsteps of the LHC, the Future Circular Collider (FCC) will be the next multi-generational international collider project. In the first stage, FCC-ee will collide intense beams of electrons and positrons at centre of mass energies between 88 and 365 GeV, making it an electroweak, flavour, Higgs and top factory. The unprecedented statistical precision requires FCC-ee experiments to limit their systematic uncertainties to the very minimum.
The precise reconstruction of the interaction vertices is core to most measurements at FCC-ee such as, for example, rare flavour physics processes and the measurement of Higgs and Z decays to bottom and charm quarks and taus.
This contribution will discuss the requirements of FCC-ee vertex detectors, covering the necessary impact parameter resolution, needed rate capability given beam-induced backgrounds, and radiation tolerance, while keeping the material budget below $\approx 0.3\%\ x/X_0$ per detection layer.
These detector requirements translate into requirements on the sensors used for the vertex detector. As discussed in this contribution, they need to feature $\leq 3\mu$m spatial resolution and provide timing information of $\mathcal{O}(\mu$s-ns) while keeping power consumption minimal to allow for air-cooling of the detector –minimising the detector material budget.
The only type of sensor capable of aiming to fulfil such requirements are CMOS Monolithic Active Pixel Sensors (MAPS), which combine signal generation, amplification and readout into a single silicon die. Therefore, the rest of this contribution will present an overview of existing and planned MAPS technologies and prototypes towards fulfilling the stringent FCC-ee vertex detector requirements.
Lastly, a short outlook towards novel FCC-ee vertex detector designs will be given.

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