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# The ILC Vertex Detector requirements

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After few decades of R&D, the International Linear Collider (ILC) project has reached a level of maturity proving the feasibility of the machine and of the detectors. The ILC physics goals cover a very wide and ambitious program including top-quark quark physics, electroweak precision measurements, direct and indirect searches beyond the Standard Model (BSM) like SUSY, dark matter manifestations, exotic particles and phenomena, etc., and an extensive Higgs physics program covering mass, couplings to fermions and bosons, quantum numbers and total width measurements. These measurements are expected to reach an unprecedented level of precision in most of the cases, which will allow probing physics BSM, since typical deviations from the Standard Model are expected to be in the order of magnitude of the ILC sensitivity.

To accomplish the ambitious physics program of the ILC, the vertex detector will be essential for providing the necessary physics performances in terms of flavor tagging, displaced vertex charge determination and low momentum tracking capabilities.
Taking advantage of the much less demanding running conditions at the ILC than at hadron colliders like LHC, the vertex detector is expected to reach particularly high performances as far as spatial resolution and material budget are concerned (typical impact parameter resolution of the order of 5 microns and material budget in the order of 0.15-0.2 % of radiation length per layer).

In addition, the particular time structure of the beams has major consequences on the specifications of the detectors and their read-out architecture. It allows to concentrate the read-out during 199 ms beamless periods separating 1 ms long bunch trains or to suppress the average power consumption by switching off (at least partially) the detectors in-between trains (the so called power pulsing).

Finally, the beam related background of the ILC, which translates into a high rate of low momentum-e-e+ pairs hitting the vertex detector, drives the expected occupancy (and the related necessary read-out speed) as well as the radiation load.

The talk will focus on the vertex detector requirements following from both the physics and the experimental constraints. Wherever different, the aspects to each detector concepts (SiD and ILD) will be discussed.

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