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Vacuum

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This lecture introduces major physics and technology aspects of accelerator vacuum systems. Following an introduction, in the second section generic vacuum quantities such as pressure, gas density, the gas equation, pumping speed, conductance are introduced. Since accelerators typically have lengthy vacuum tubes, one-dimensional calculation is in many cases sufficient to compute a pressure profile for an accelerator, and methods for doing so are developed in the next section. In the fourth section accelerator specific aspects of vacuum are considered. This includes lifetime limiting effects for the particle beam, such as bremsstrahlung, elastic and inelastic scattering. Requirements for vacuum properties are derived. In the fifth section types of components and suitable materials for accelerator vacuum systems are described. Such components are for example flange systems, vacuum chambers for accelerators and the different types of pumps.

Presenter: SEIDEL, Mike