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High-gradient accelerator technology

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In contrast to existing linear accelerators (LINAC) based on superconductivity, several institutes are currently developing high gradient LINACs based on normal-conducting cavities. A LINAC based on this technique has some intrinsic advantages over their superconducting cousins e.g. lack the necessity for cryogenic cooling, can obtain larger accelerating gradients and hence allow for a reduced length of the accelerator. These advantages are key in the realization of multi GeV/TeV research accelerators such as the Compact Linear Collider at CERN.

The mechanical properties of these high-gradient accelerator parts touch the limits of what is achievable with currently available manufacturing techniques. The increasing technical specifications and demands for volume-production not only drive industry to improve their currently available techniques but also to industrialize techniques newly developed by the research institutes. In this process of maturation from a proof-of-principle setup to building a fully operational accelerator, science will benefit from the knowledge in industry on redesign for manufacturability and series production. On the other hand, the newly achieved and industrialized competences are typically not limited to the fabrication of accelerator parts but applicable over a broader range of products. Hence, the main-stream customers of the industrial partners will finally benefit to from the "technology transfer"too.

Furthermore, normal-conducting techniques are not limited to research accelerators but also find their ways in commercial and medical applications. Applications in which other advantages of the normal conducting accelerator e.g. cost of owner-ship, real-estate size, reliability and maintainability play a far more important role than the shear accelerating gradient.

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