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Summary of RF Breakdown Studies using Single Cell Standing Wave Accelerating Structures

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The acceleration gradient is a critical parameter affecting the feasibility and cost of large-scale particle accelerators such as normal conducting linear colliders. The main obstacle to increasing the acceleration gradient or improving the reliability of a linear accelerator at a certain gradient is vacuum RF breakdown. To understand the basic physics of the RF breakdown in cavities suitable for use in linear colliders, we developed a setup consisting of a reusable mode launcher and a short standing wave accelerating structure. Over forty cavities have been tested over the past two decades, giving us insight into different shapes, materials and manufacturing methods. In this report we will summarize the results.

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