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Reducing the RF power demands for future colliders

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The largest power demands of most future colliders, particularly Higgs factories and muon colliders, is dominated by the wall-plug-power required to run the RF systems and its cooling. Most of this power does not end up in the beam but is power lost as heat in the RF amplifiers, cavities and RF loads. This power lost is not a fundamental limit and there has been recent progress in addressing each to increase the efficiency of the RF system (and its associated cryo-plants in the case of superconducting machines) by a factor of 2 to 10 depending on the machine. This talk will provide an overview of those recent advances covering high efficiency klystrons and SSPA, novel materials for superconducting RF and fast reactive tuners and discuss each in the context of future colliders.

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