Optimal Control of Particle Accelerators

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Abstract: The talk considers the optimal control of particle accelerators by means of exterior magnetic fields. The aim of the optimization is to adjust the trace of the particles to a given desired track. The forward problem is modeled by a nonlinearly coupled system consisting of the instationary Maxwell's equations and an ODE for the relativistic particle dynamics. Beside pointwise state constraints on the particle position, the optimization is subject to div- and curl-constraints on the control. After confirming existence and optimality conditions for the problem at hand, preliminary numerical results will be presented.

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