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Optimization of CESR-c Optics for High Time-Integrated Luminosity[1] MACKENZIE VAN CAMP, Lawrence University, JAMES CRITTENDEN, Laboratory for Elementary-Particle Physics, Cornell University, CESR OPERATIONS GROUP TEAM — The Cornell Electron Storage Ring (CESR) operates at world-record production rates for bound states of charm quarks, enabling unprecedented statistical precision in the study of their decays. Its success depends on maximizing the time-integrated collision rate between the counter-circulating e-/e+ beams in CESR, which is limited by a combination of stored beam current and beam lifetime. These are in turn constrained by the requirements of operating counter-circulating particle beams of opposite charge in a single beampipe, including managing the attraction between the beams as they collide and the repulsion between the beams as they pass each other in their orbits. Two strategies for regulating these interactions are adjusting the beam current, which can sacrifice luminosity, and adjusting the separation between the beams, which is limited by the size of the beampipe and the strength of the repulsion between the beams. We describe a modeling algorithm which optimizes operating currents and orbit separations. The algorithm successfully finds values for the beam current and orbit separation which are likely to increase the time-integrated collision rate, making it a useful new tool for optimizing CESR's optics.

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