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Betatron Tunes in the Proposed Medium-Energy Electron-Ion Collider at Jefferson Lab COLIN JARVIS[1], Macalester College, BALSA TERZIC[2], Jefferson Lab — The future of Jefferson Lab lies within the construction of a Medium-Energy Electron-Ion Collider (MEIC), which is currently in the proposal stage. In a synchrotron collider storage ring, the orbiting beams oscillate transversely in both the horizontal and vertical directions. The frequency of these oscillations is called the *betatron tune*. Depending on the design tune of the collider, non-linear beam-beam effects can cause rapid degradation of the beam quality, thus yielding poor luminosity, which is the figure of merit in the MEIC. The non-linear nature of the beam-beam effects poses a serious obstacle to the efficient analysis of potential design tunes. The goal of this research was to find an X and Y betatron tune, or *working point*, which optimizes luminosity performance. Using code developed at Lawrence Berkeley National Lab, particle interactions were numerically simulated. Beginning with a previously known working point, systematic simulations were run to scan the adjacent tunespace. A subsequent working point was discovered that provides a 33 percent increase in theoretical peak luminosity over the current MEIC design.

[1]Undergrad summer research; application for the CEU
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