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ALBA beam lifetime optimization using RCDS

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The ALBA synchrotron operates in a Touschek dominated lifetime regime, which depends mainly on the momentum acceptance and the transverse beam size along the machine. Although in the current ALBA machine the RF dominates the momentum acceptance, this will not be the case for the foreseen upgrade of the machine ALBA-II. For this reason, we have developed an algorithm to optimize the beam lifetime by varying the sextupole magnets. This algorithm is based on the Powell optimization of the Robust Conjugate Direct Search (RCDS) method, and several tests have been performed at the present ALBA machine. In this case the sextupole settings are first modified so that the RF is no longer the only limiting factor in the momentum acceptance. The algorithm optimizes the ALBA beam lifetime by varying the sextupoles to follow a constant chromaticity, while the skew magnets are tweaked to keep the beam sizes constant during the optimization. This paper shows the experimental results using this algorithm, and discusses its application to the ALBA-II case.

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Footnotes

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Yes

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