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# Multi-objective genetic algorithm for synchrotron radiation beamline optimization

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In beamline design, there are many floating parameters that need to be tuned; manual optimization is time-consuming and laborious work, and it is also difficult to obtain well optimized results. Moreover, there are always several objectives that need to be considered and optimized at the same time, making the problem more complicated. For example, asking for both the flux and energy to be as large as possible is a usual requirement, but the changing trends of these two variables are often contradictory. In this study, a novel optimization method based on a multi-objective genetic algorithm is introduced, the first attempt to optimize a beamline with multiple objectives. In order to verify this method, beamline ID17 of the European Synchrotron Radiation Facility (ESRF) is taken as an example for simulation, with energy and dose rate as objectives. The result shows that this method can be effective for beamline optimization, and an optimal solution set can be obtained within 30 generations. For the solutions whose objectives are both improved compared with those of ESRF beamline ID17, the maximums of energy and dose rate increase by around 7% and 20%, respectively.
(The corresponding paper is published: https://journals.iucr.org/s/issues/2023/01/00/ve5159/ve5159.pdf)

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## Footnotes

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