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Concluding Remarks on the GASOLINE Project

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For synchrotron based user experiments, radiation characteristics such as energy resolution, flux and beamsize are of great importance in terms of the feasibility of the experiment. The main difficulty stems from adjusting the optics and other components throughout the synchrotron beamline to obtain the required energy resolution, flux and beam position values. The optimum parameters are determined by manually (remotely) controlling the each element constituting a beamline, which takes several days even weeks. The main goal of the Genetic Algorithms-based Synchrotron radiation Optimization for an X-ray beamLINE (GASO-LINE) project was to optimize the synchrotron beamline components operating in the hard and soft X-ray region through Genetic Algorithms (GA) in order to achieve the required synchrotron beam characteristics for dedicated user experiments. Two other optimization algorithms were employed in addition to Multiple Objective Evolutionary Algorithms and variants (e.g. GA, NSGAII/III etc.), namely Particle Swarm Optimization (PSO) and Artificial Bee Colony Optimization (ABC). Results for the optimization processes designed and implemented in the project show that the bio-inspired approaches employed in the project have achieved significant success in the order of seconds execution time.

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