

# Integration of Multi-Objective Genetic Algorithm and neural networks in linac optimization.

*Thursday, March 7, 2024 3:00 PM (1 minute)*

Multi-Objective Genetic Algorithm(MOGA) is one of promising approach for optimizing nonlinear beam dynamics in accelerators. For explorative problems that have many variables and local optima, however the performance of MOGA is not always satisfactory. To improve the efficiency of optimization in linac beam line, we propose a novel integration of MOGA and neural networks. The neural network is trained with the data produced in the evolution of the MOGA. The objective values of the offspring are estimated with the trained neural network. Based on the estimated results, those offspring are ranked with the nondominated sorting method. We therefore propose a novel Machine Learning technique in which nonlinear tracking is replaced by two well-trained neural networks to beam line lattice.

## Primary Keyword

## Secondary Keyword

## Tertiary Keyword

**Primary authors:** KIM, Chanmi (korea univ.); PARK, Chong Shik (Korea University, Sejong)

**Co-author:** Prof. KIM, eun-san (Korea Univ. (Sejong))

**Presenter:** KIM, Chanmi (korea univ.)

**Session Classification:** Poster/Demos

**Track Classification:** Optimization & Control