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Improved VLBI scheduling through evolutionary strategies

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Since mid-2020, various Very Long Baseline Interferometry (VLBI) observation programs organized by the International VLBI Service for Geodesy and Astrometry (IVS) are scheduled using a new algorithm inspired by evolutionary processes based on selection, crossover and mutation. It mimics the biological concept "survival of the fittest" to iteratively explore the scheduling parameter space looking for the best solution.

In this work, we will present the general workflow of the algorithm as well as discuss its strengths and potential weaknesses. Moreover, we will highlight how the improved scheduling affects the precision of geodetic parameters. In the case of difficult-to-schedule OHG sessions, an improvement in the precision of the geodetic parameters of up to 15% could be identified based on Monte-Carlo simulations, as well as an increase in the number of observations of up to 10% compared to classical scheduling approaches.