Quasi-Integrable Nonlinear Optics Experiment at IOTA

**Abstract:**

At Integrable Optics Test Accelerator it is possible to create a nonlinear focusing optics with one invariant of motion using just conventional magnets. 6D simulations show that this will allow to achieve a tune spread of 0.05 without significant reduction of dynamic aperture.

**Summary:**

Intensity of accelerators is limited by resonances and instabilities; their cause is linear focusing optics. Nonlinear integrable optics provides zero resonance strength and suppression of instabilities. The experiment to test this concept is going to be held at Integrable Optics Test Accelerator at Fermilab.

Full integrability requires a complex special magnet, but it is possible to create a nonlinear focusing optics with one invariant of motion using just conventional magnets, such as octupoles. 6D simulations show that this will allow to achieve a tune spread of 0.05 without significant reduction of dynamic aperture.

During the experiment we plan to obtain Poincare maps of the phase space for a given strength of the nonlinear potential and study the dependence of betatron tunes on amplitudes and the strength of the nonlinearity.