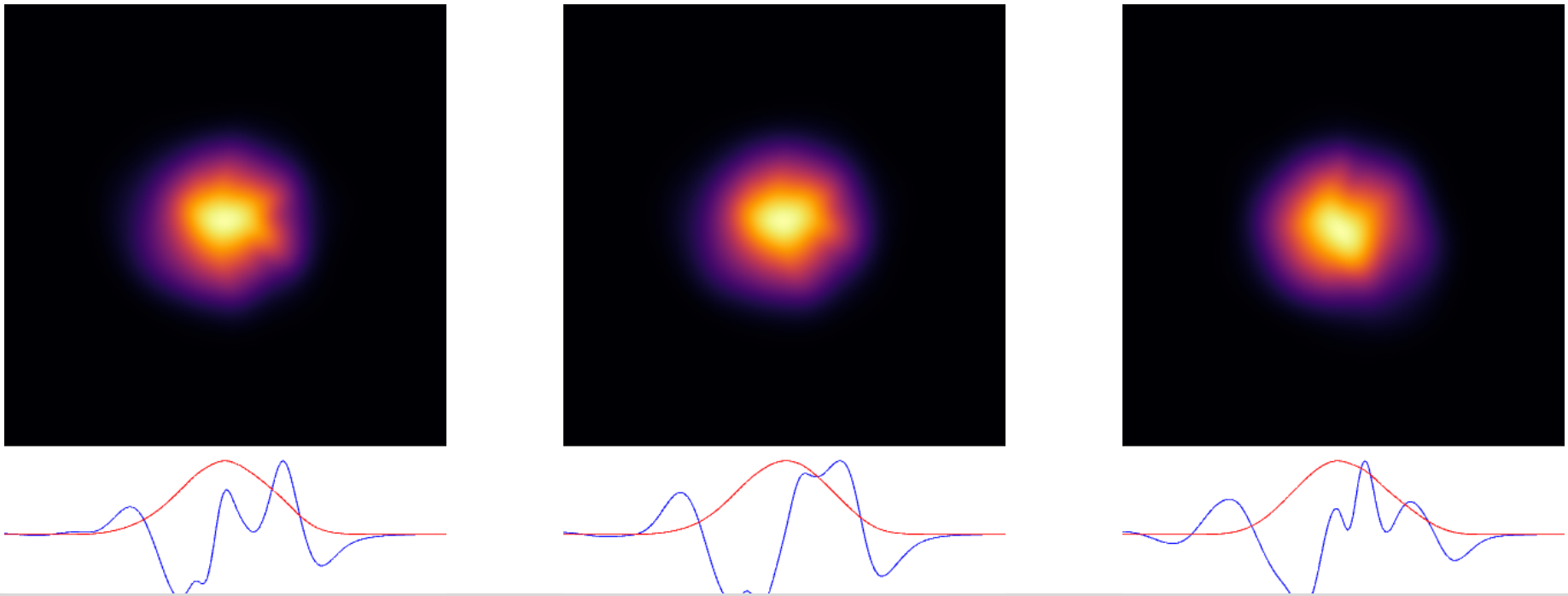
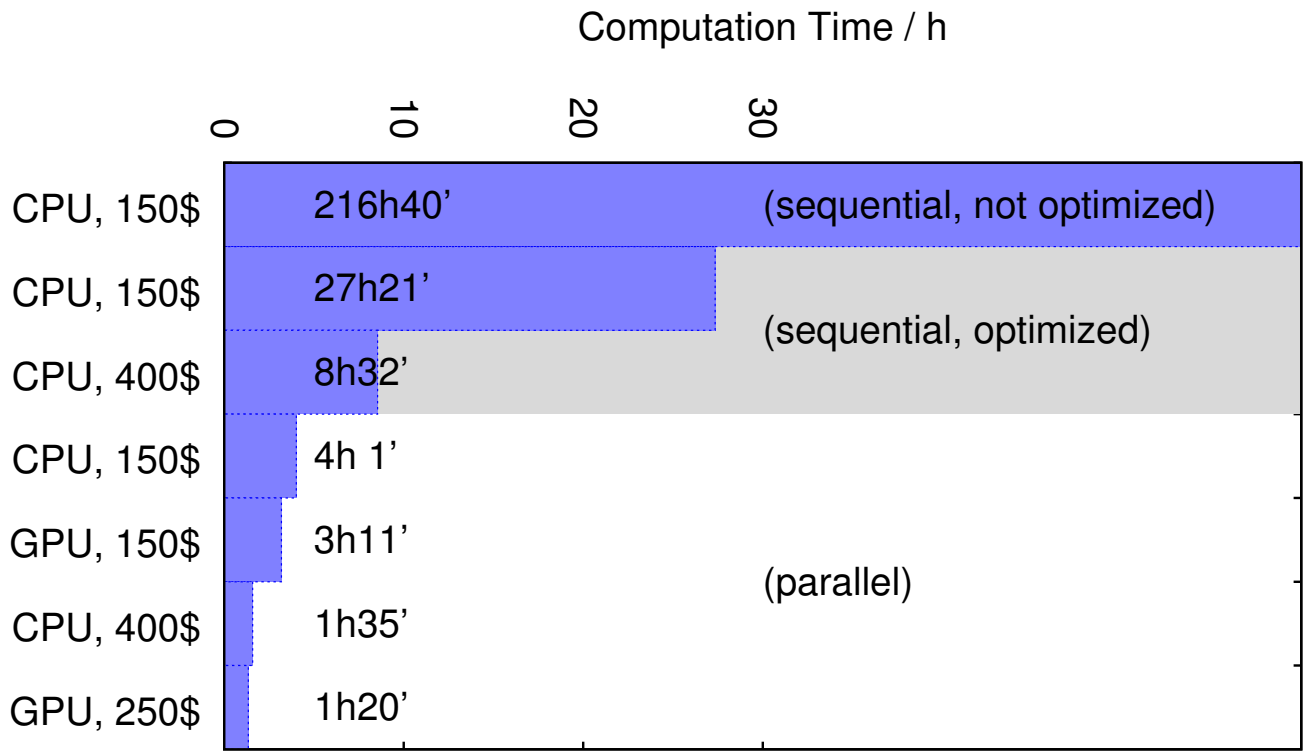
Vlasov-Fokker-Planck Solver – Principle

Simulation following algorithm by Warnock and Ellison [SLAC-pub-8404]:

- Charge density is rotated in longitudinal phase space
- Radiation is modeled by damping and diffusion
- Self-interaction is applied as wake potential
- Optimized the algorithm for stability and computational performance

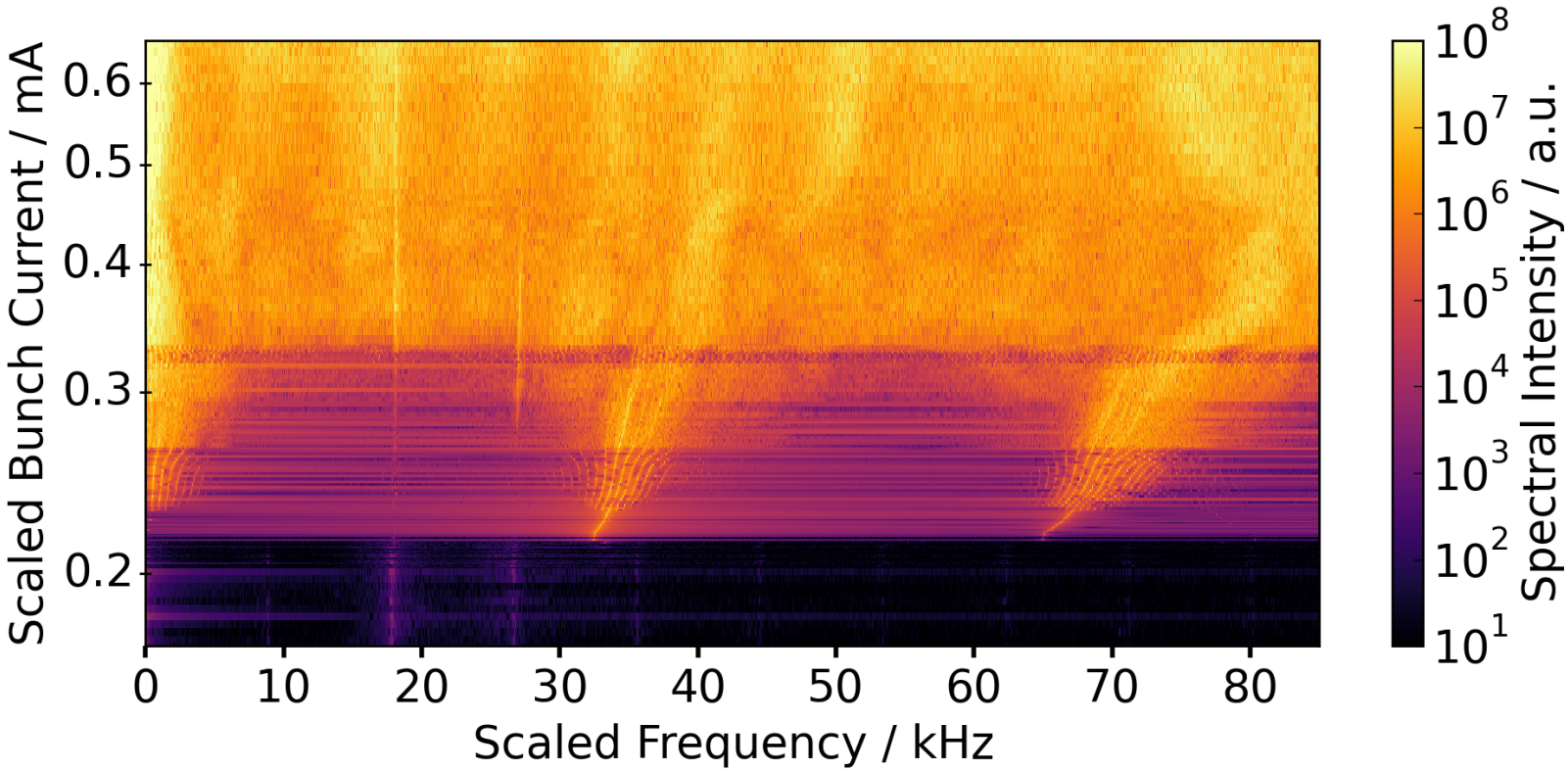


Computation Time



Time to simulate 500 synchrotron periods using a 512x512 pixel grid on a standard Desktop PC

Example Result: Bursting Spectrogram



- Spectrogram comparable to measured data
- Simulated on a desktop PC in just one day (grid: 256x256 pixels)
- Particle tracking would take many days on computing clusters