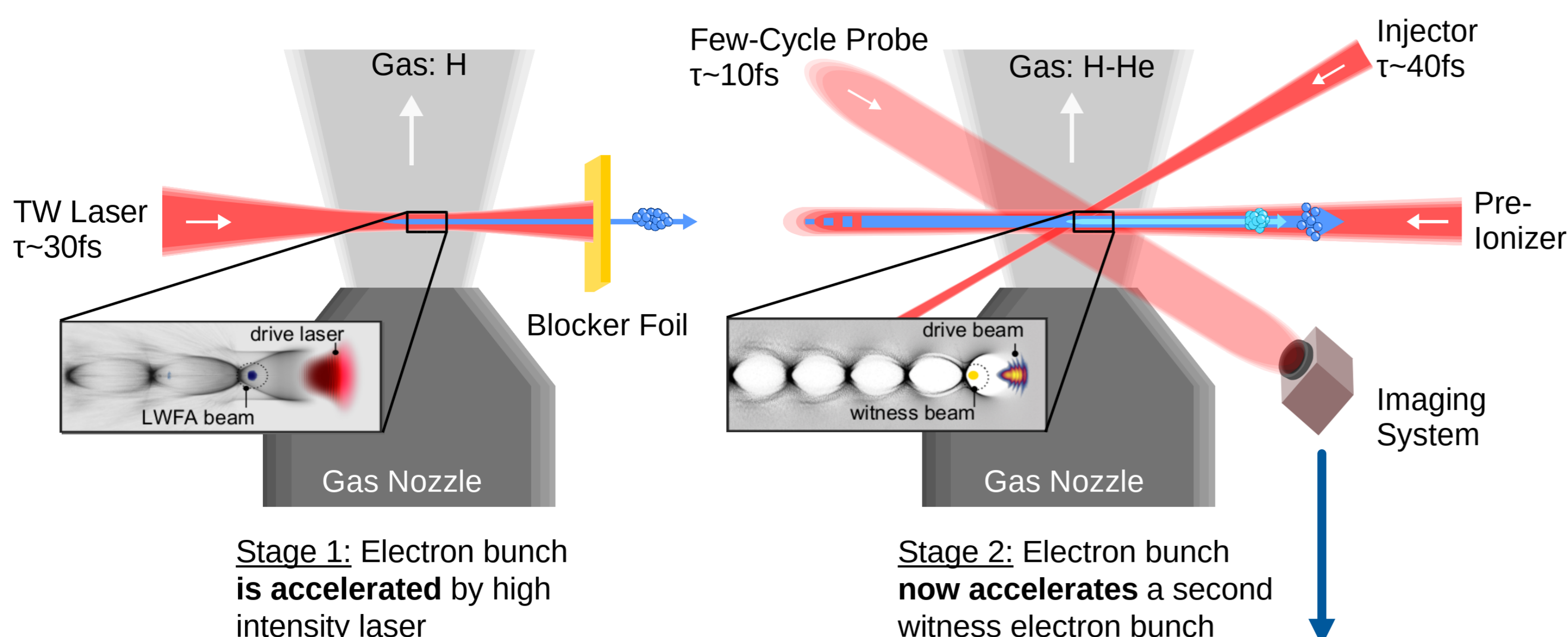


# Synthetic Optical Imaging for Investigating Injection Radiation in Hybrid LPWFAs

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## Radiation Signal in Experimental Shadowgrams of Laser Driven Plasma Wakefield Accelerators

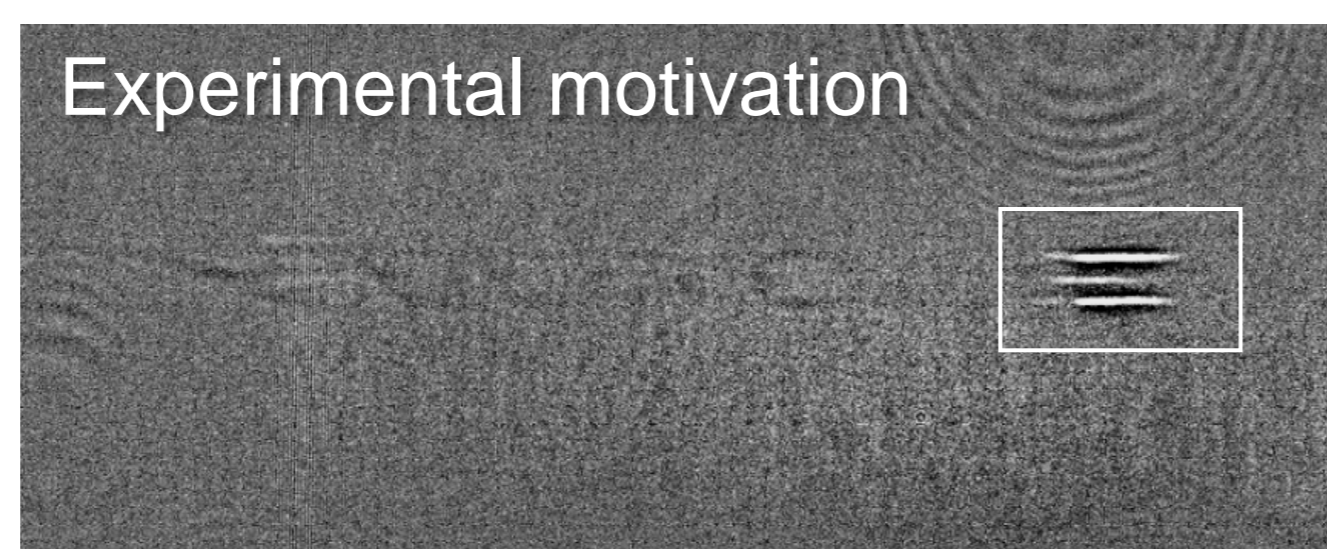


Poster, Apr 14: Realization of plasma photocathode injection in a compact plasma accelerator powered by laser-accelerated electron beams

Hidding, B., *et al.*, Ultracold Electron Bunch Generation via Plasma Photocathode Emission and Acceleration in a Beam-Driven Plasma Blowout, *Phys. Rev. Lett.* **108**, 035001 (2012)

Ufer, P., *et al.*, Ultra-compact plasma photocathode in a hybrid wakefield accelerator, *submitted*

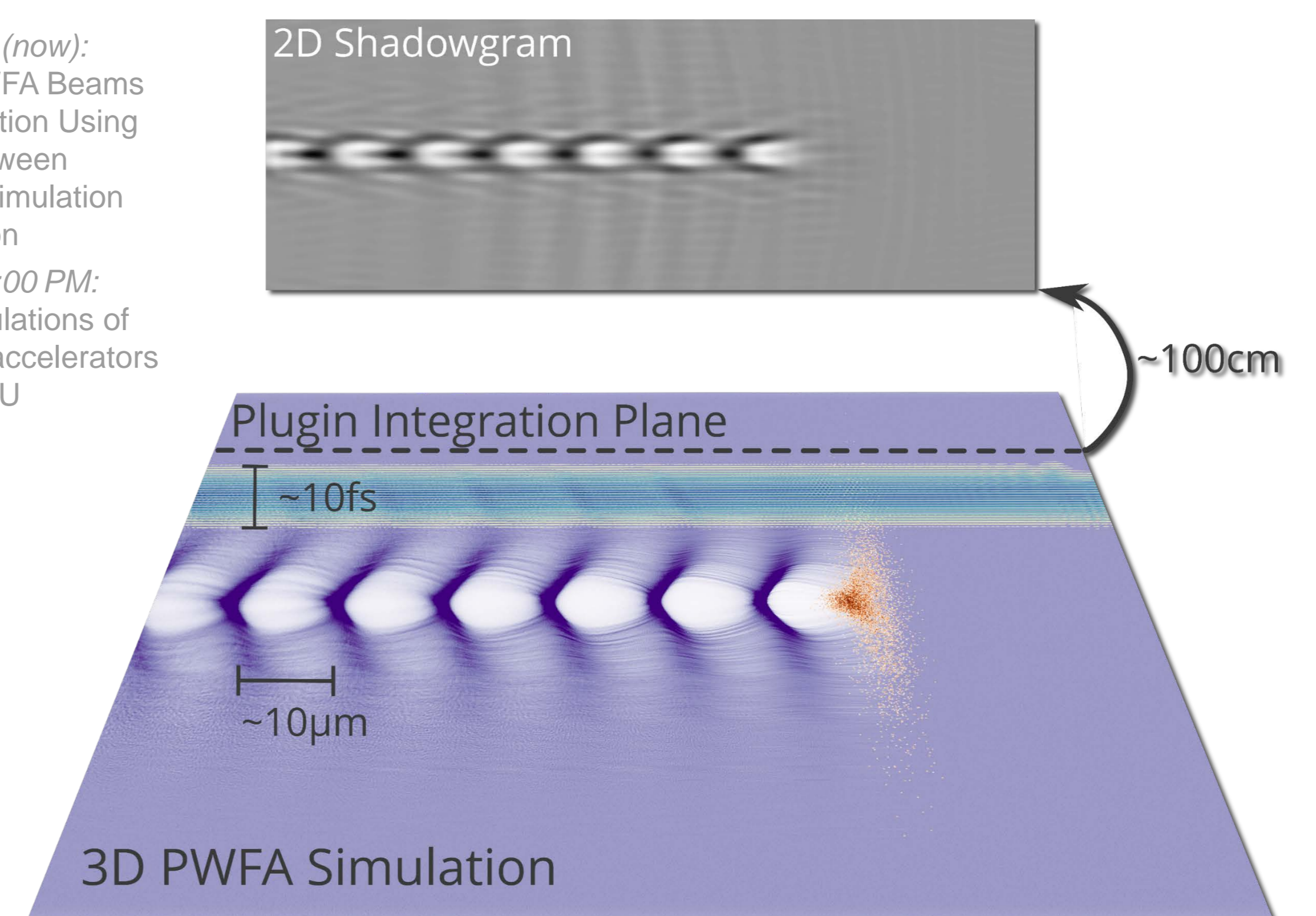
### Experimental motivation



- Known properties of radiation signal:
- Appears when injector hits first cavity
  - Independent of ionization
  - Independent of probe laser
  - Dependent of injector polarization
  - Shape varies from shot to shot

## In-Situ Extension of Simulation Box into Far Field on Virtual Screen

Poster Apr 15 (now): Advancing LWFA Beams for FEL Operation Using Synergies between Experiment, Simulation and Automation  
Talk Apr 17, 5:00 PM: Exascale simulations of laser plasma accelerators with PIConGPU



Laser-Plasma interactions of probe and accelerator are fully simulated with PIConGPU, including the full physics, such as relativistic refraction, diffraction, Faraday rotation, and ionization effects.

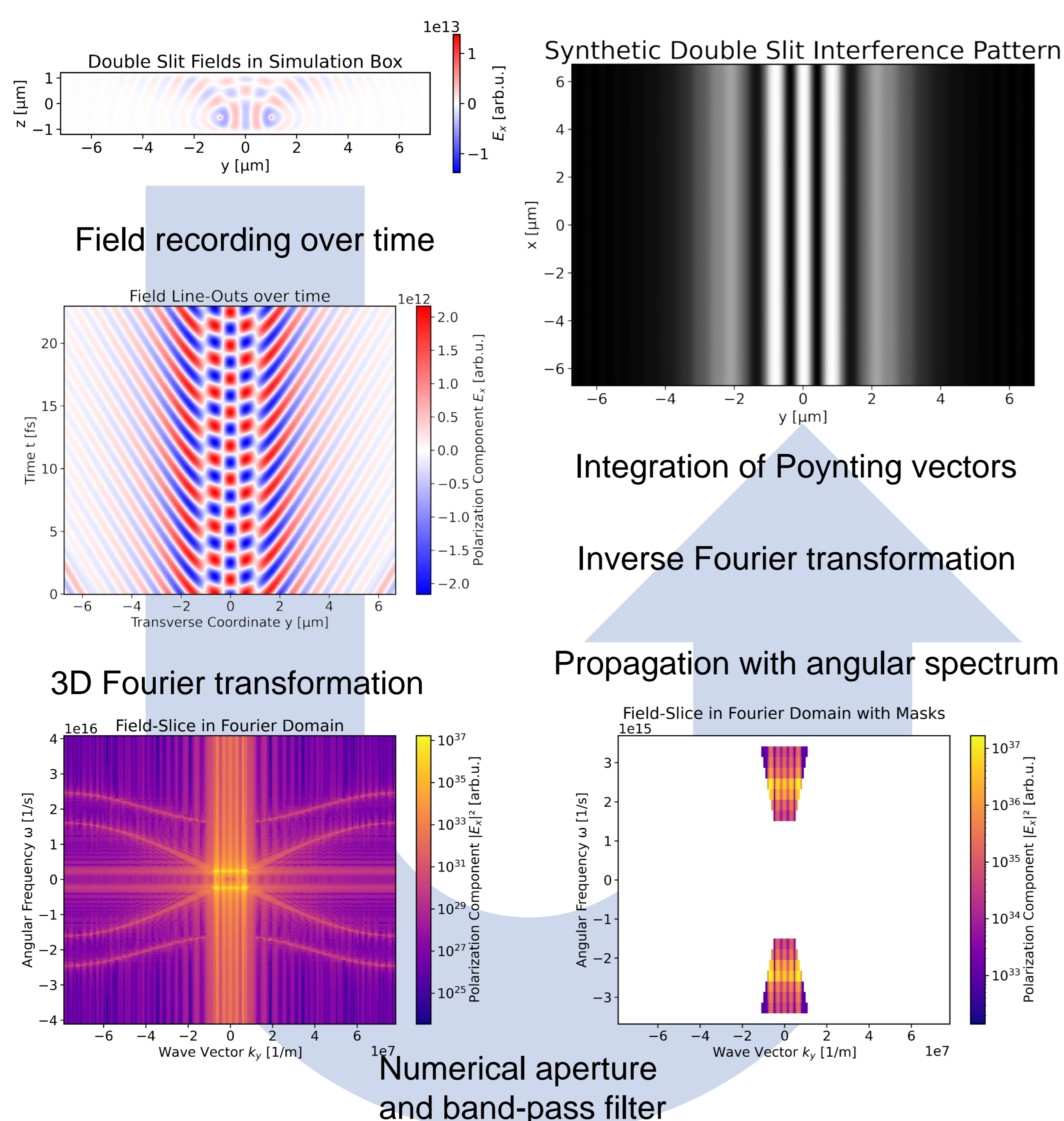
**PIConGPU**



<https://github.com/ComputationalRadiationPhysics/picongpu>



## Shadowgraphy Plugin in a Nutshell: Demonstration with Double-Slit



## Capturing Synthetic Radiation Signal by Isolating Injector and Driver Interaction

