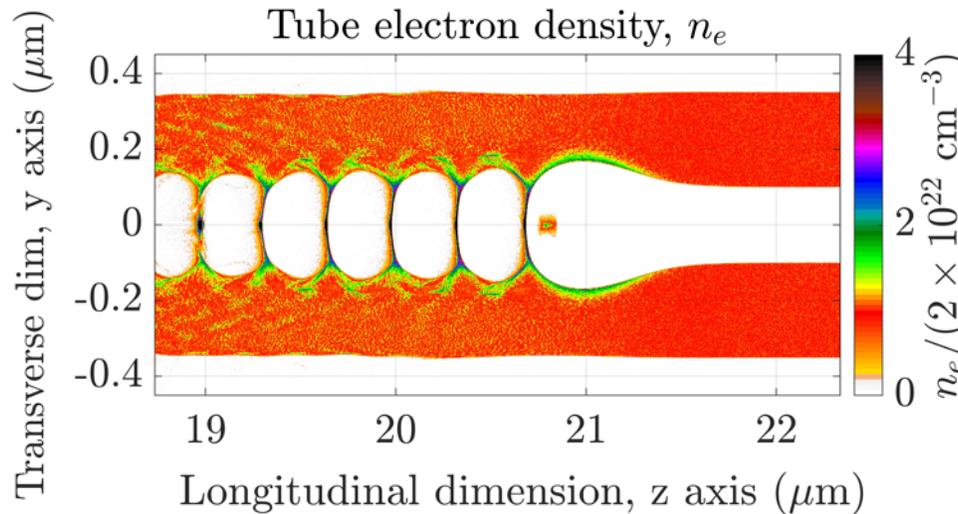


# Ultra-solid beams *using*

## Nanostructure W wigglers & Accelerators



Union of nanoscience  
& accelerator science

[arXiv:2004.09452](https://arxiv.org/abs/2004.09452)

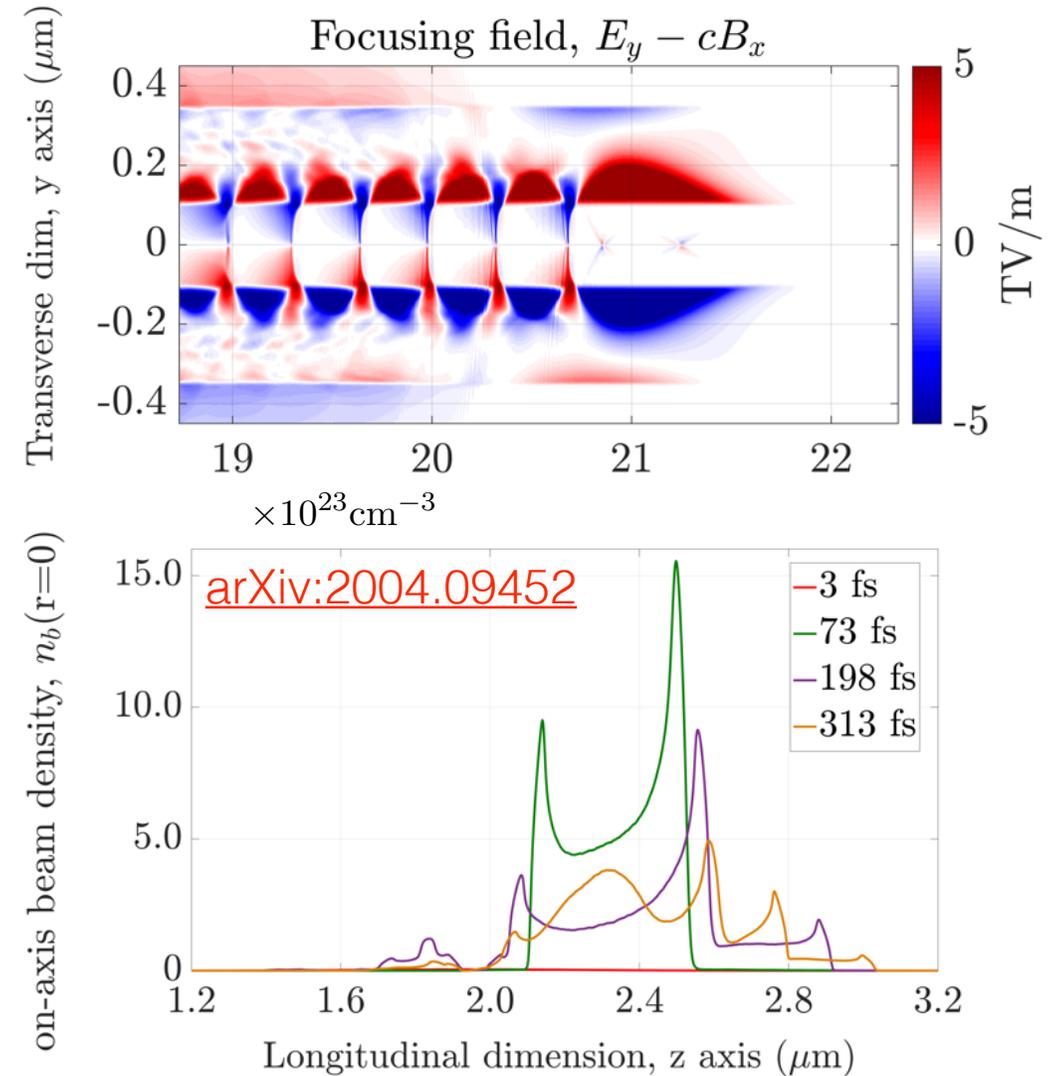
Aakash A. Sahai

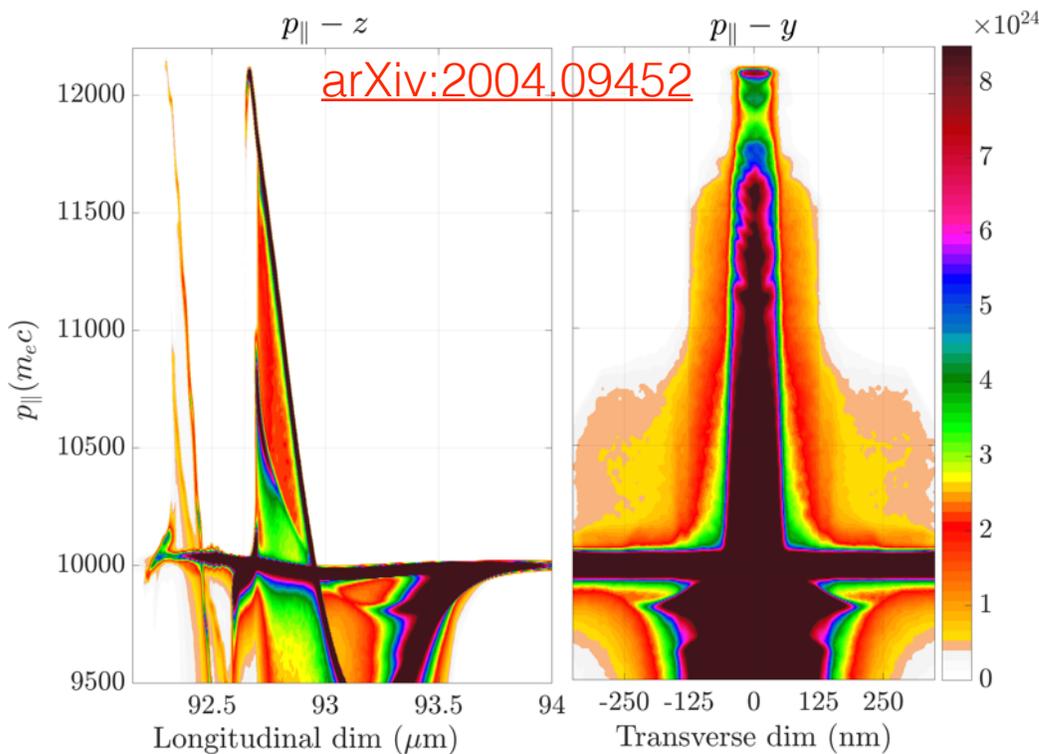
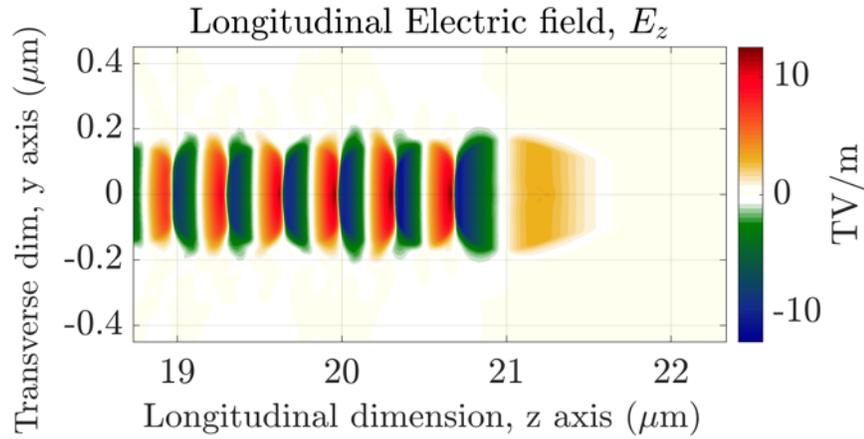
CU Denver

collaborators: T. Tajima, F. Zimmermann, J. Resta-Lopez, M. Golkowski, V. Shiltsev

snowmass'21 presentation on invitation of AF6 convenors, 23 Sept 2020

- tens of TV/m – **crunch-in** mode focusing fields
- self-focusing of the beam in crunch-in mode fields
- **ultra-solid beam densities** reached
- tens of nanometer envelope modulation
- increases the mode amplitude
- **nano-wiggler** mechanism
- O(GeV) coherent photon production  
*nanometric source size*
- development of a **gamma-gamma collider**





- tens of TV/m – **crunch-in** mode **accelerating fields**
- 100 nm scale accelerating bucket sizes
- O(GeV) scale energy gain in  $\sim 100 \mu\text{m}$
- nanostructure acc. modules – two-beam collider **TeV in a few meters**
- new **Luminosity** paradigm - **ultra-solid beam densities**
- high-efficiency – **100nm bunch length** **can fully extract energy from the crunch-in mode**

Revolutionize  
light-sources & colliders