Wakefield illustrations

30/10/2010

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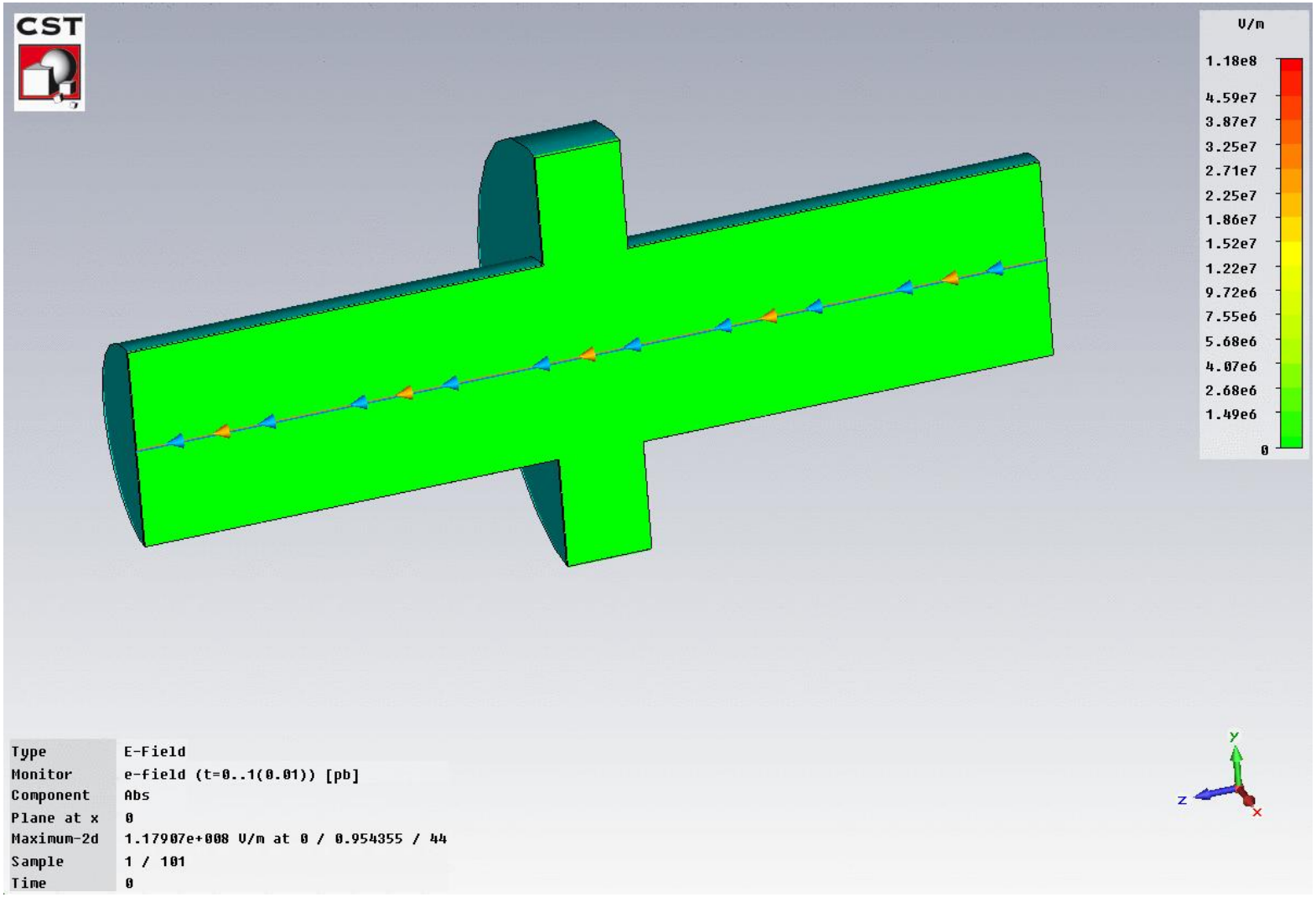
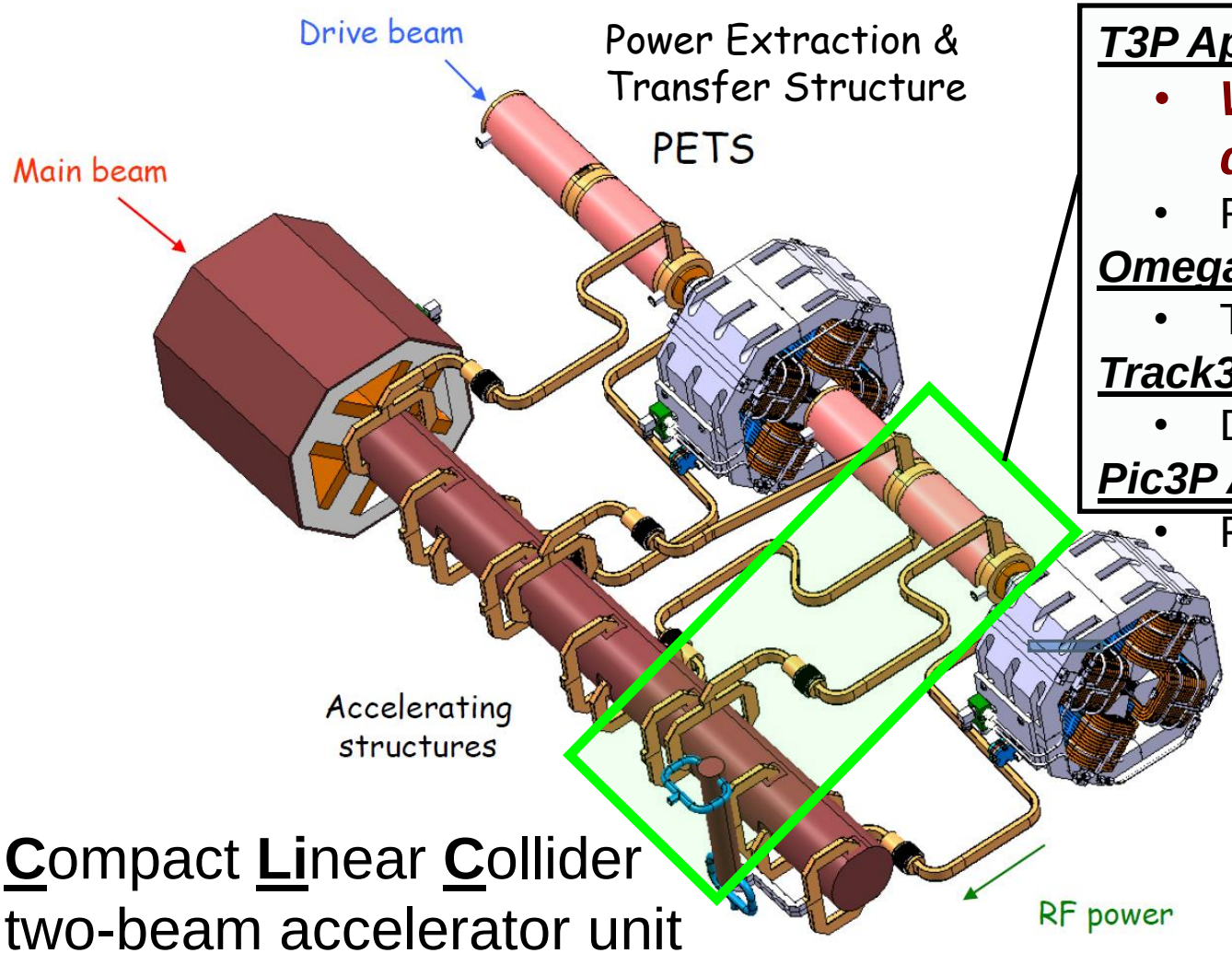
Bunch passage through the pillbox cavity



Courtesy of O. Kononenko

Courtesy of A. Candel (SLAC)

CLIC Two-Beam Accelerator



T3P Applications:
- ***Wakefield damping***
- RF power transfer

Omega3P Applications:
- Trapped modes

Track3P Applications:
- Dark current

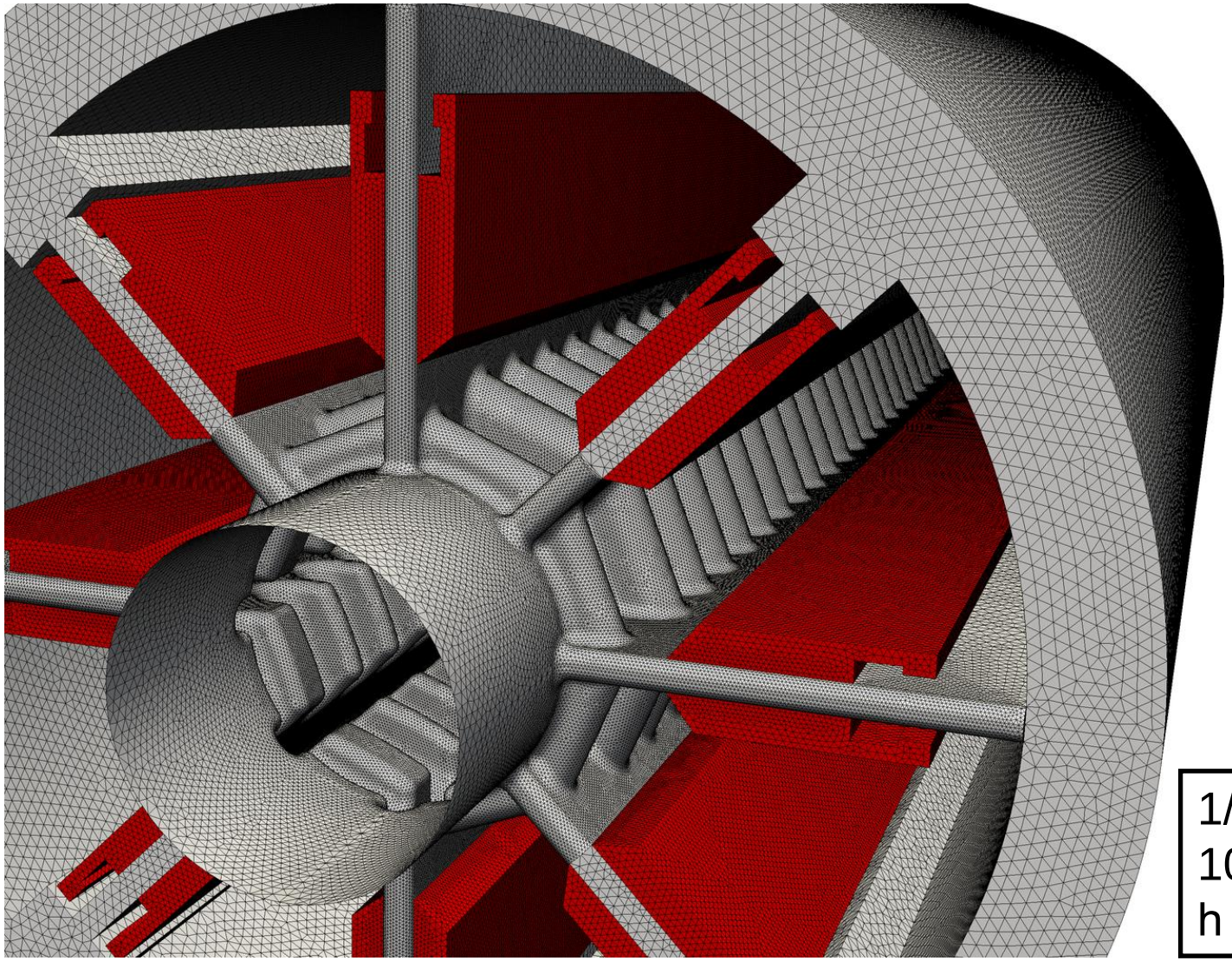
Pic3P Applications:
- Field emission

Compact **Li**near **C**ollider two-beam accelerator unit

Picture courtesy CERN

Courtesy of A. Candel (SLAC)

Unstructured Mesh Model of PETS



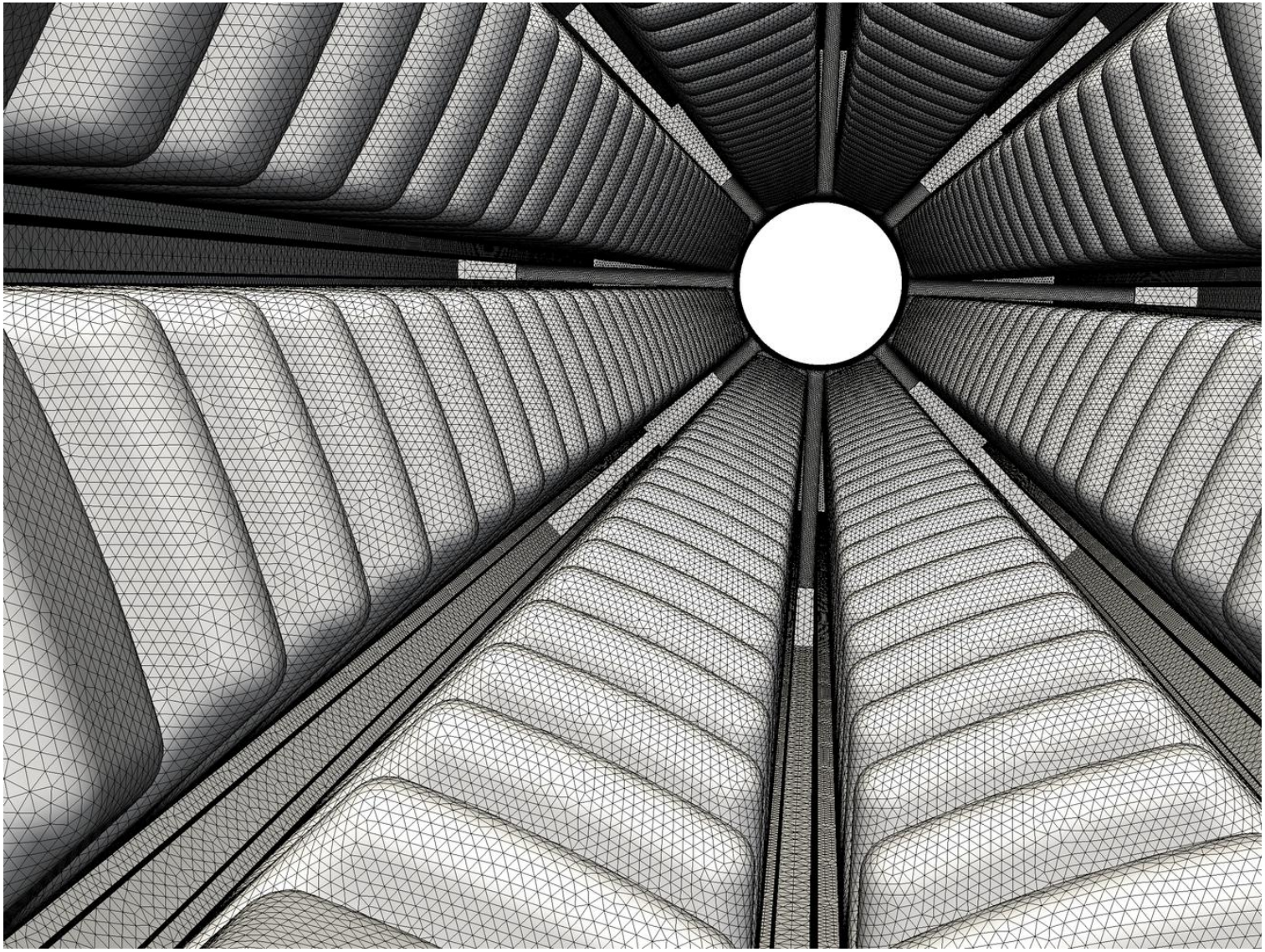
Dielectric absorbers (SiC)

1/4 model
10M elements
h ≥ 0.25 mm

CAD model courtesy CERN (May 09)

Courtesy of A. Candel (SLAC)

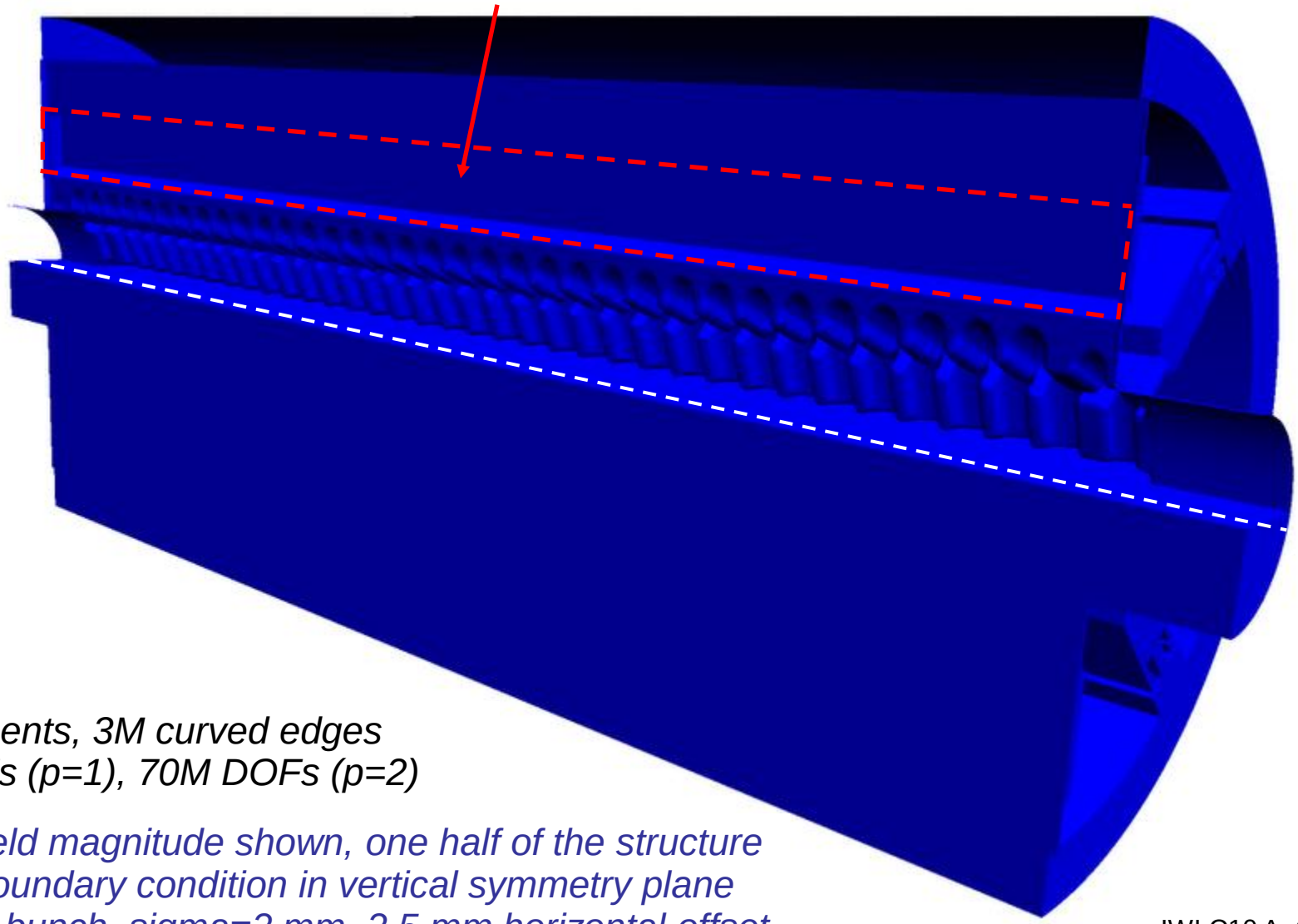
Internal View of PETS - Curved Mesh



Courtesy of A. Candel (SLAC)

T3P – PETS Bunch Transit

Dissipation of wakefields in dielectric loads: eps=13, tan(d)=0.2

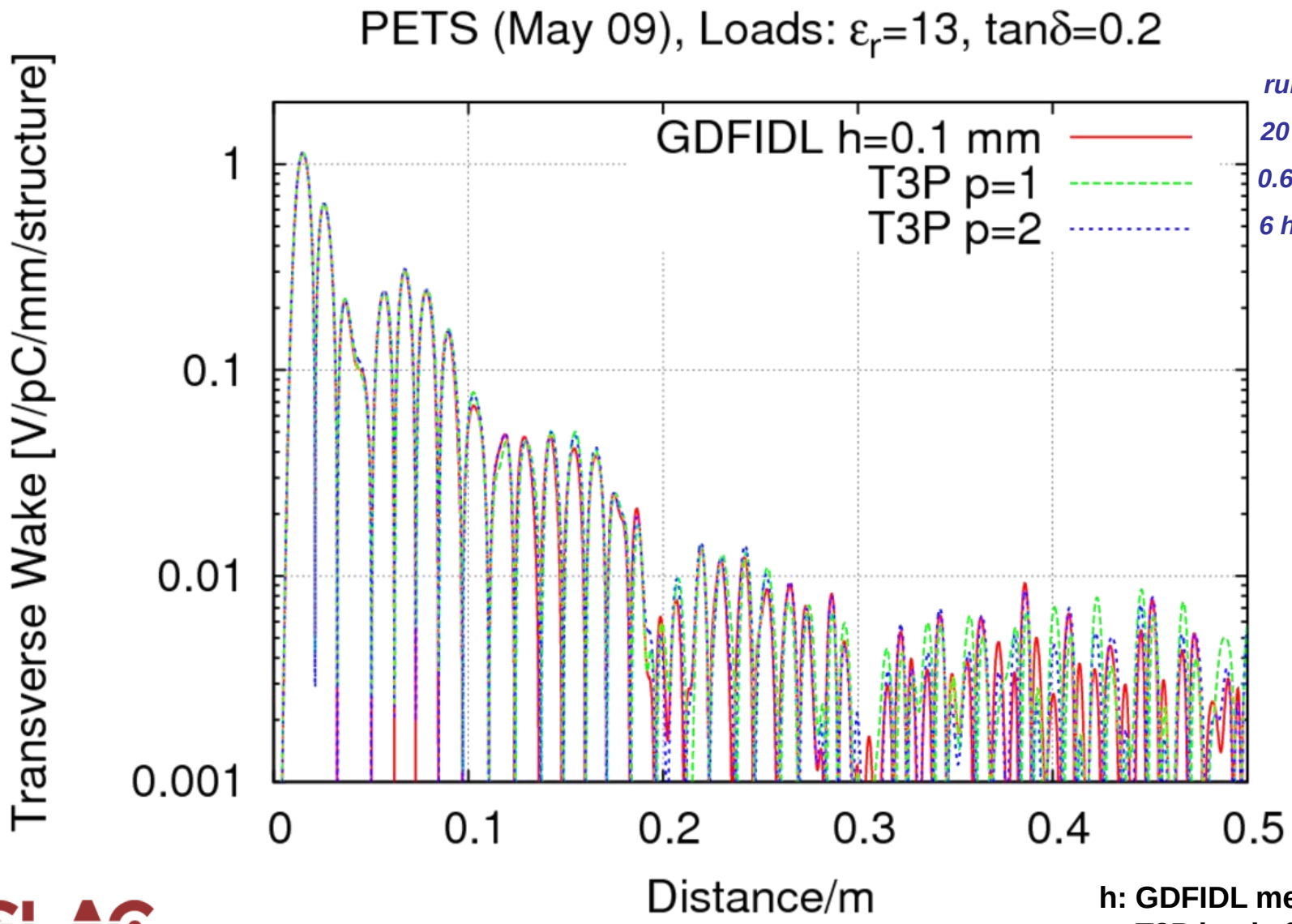


10M elements, 3M curved edges
12M DOFs (p=1), 70M DOFs (p=2)

Electric field magnitude shown, one half of the structure
Electric boundary condition in vertical symmetry plane
Gaussian bunch, sigma=2 mm, 2.5 mm horizontal offset

Courtesy of A. Candel (SLAC)

PETS Wakefield Convergence/Benchmarking



runtime:

20 hours, 80 CPUs

0.6 hours, 1200 CPUs

6 hours, 4800 CPUs

GDFIDL results by Igor Syratchev, CERN

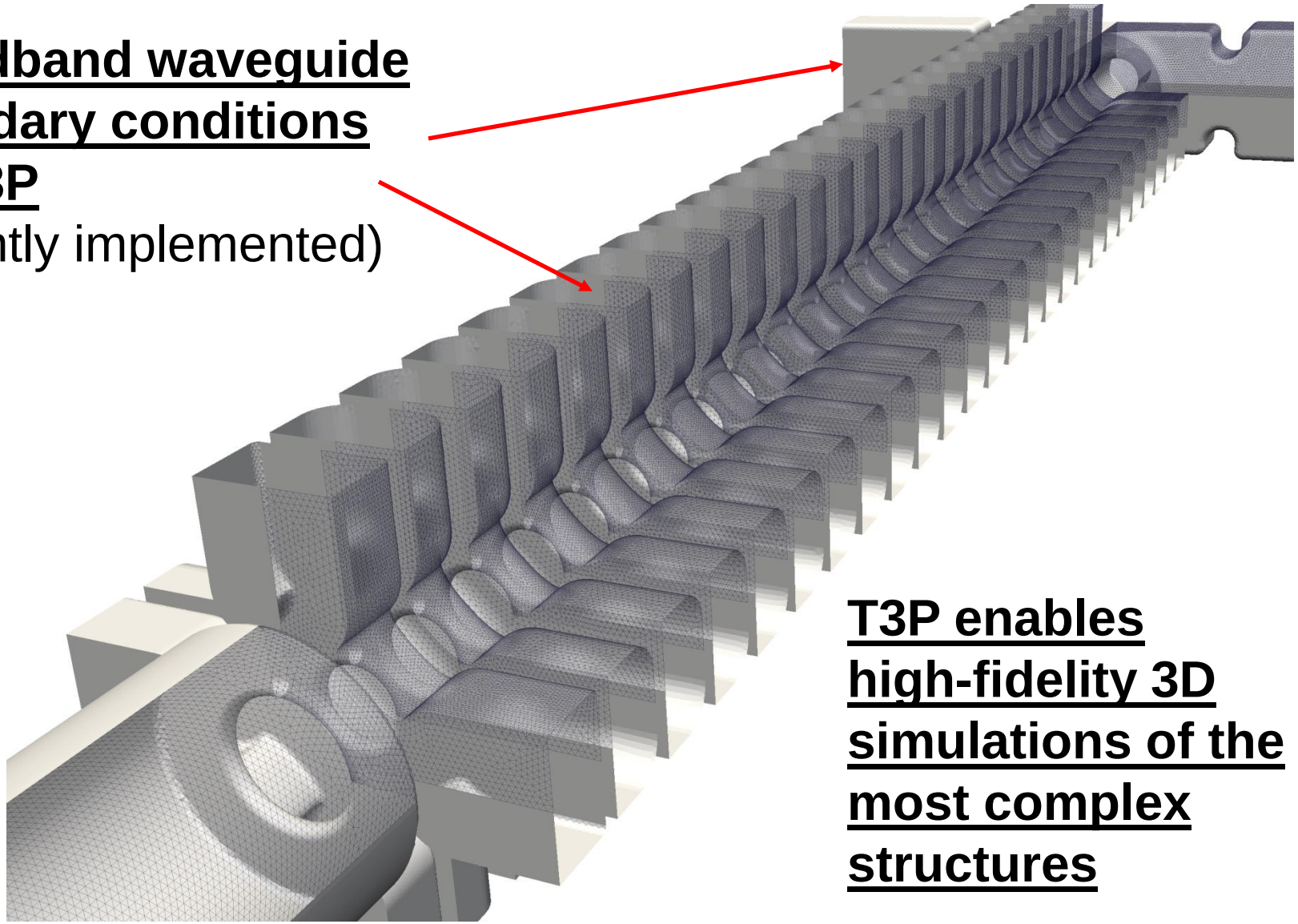
h: GDFIDL mesh step size

p: T3P basis function order

Courtesy of A. Candel (SLAC)

CLIC TD24 Accelerating Structure

Broadband waveguide boundary conditions for T3P
(recently implemented)

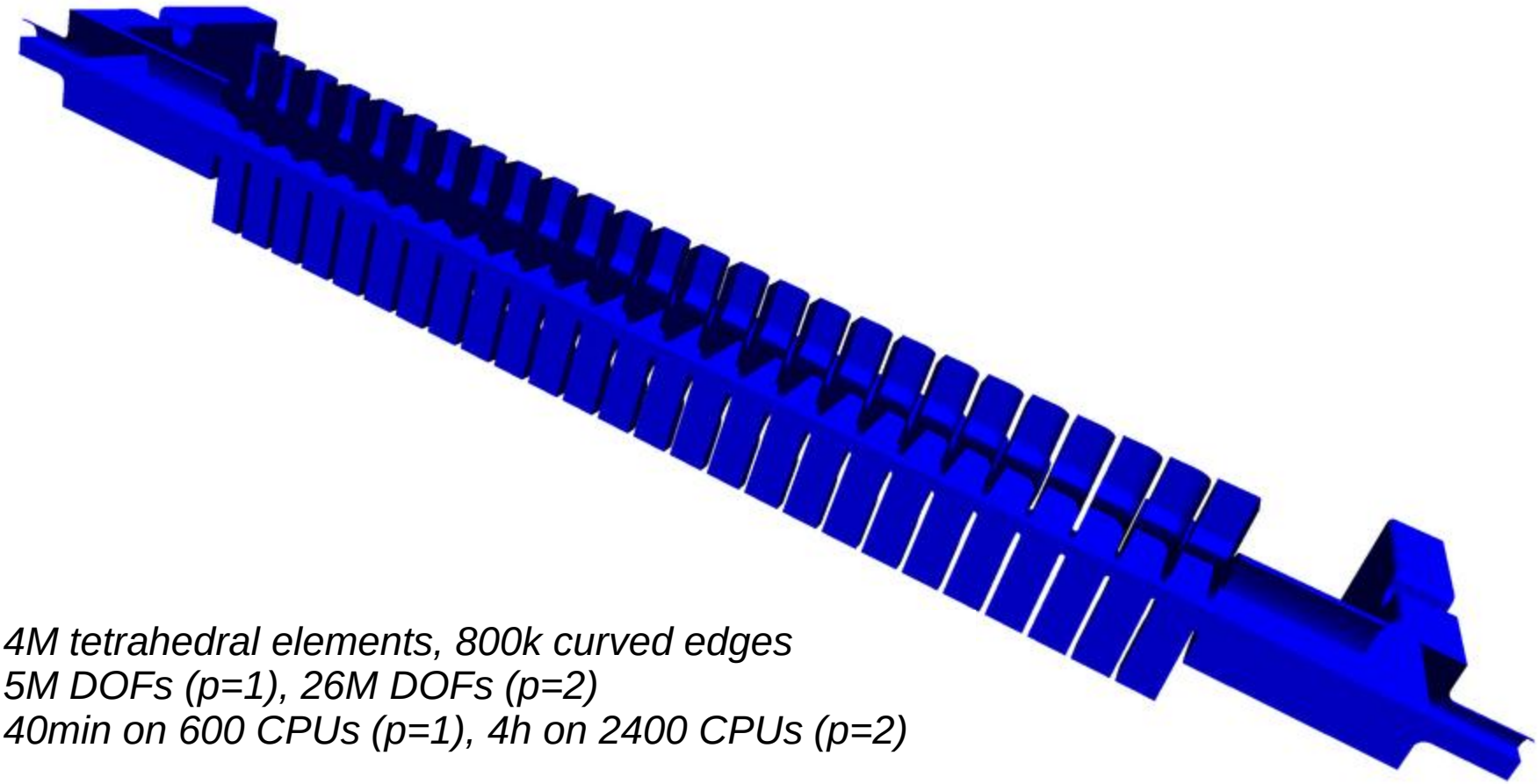


T3P enables high-fidelity 3D simulations of the most complex structures

TDA24_vg1.8 *CAD model courtesy CERN*

Courtesy of A. Candel (SLAC)

T3P: TD24 Bunch Transit



4M tetrahedral elements, 800k curved edges
5M DOFs (p=1), 26M DOFs (p=2)
40min on 600 CPUs (p=1), 4h on 2400 CPUs (p=2)

Electric field magnitude shown, one half of the structure
Electric boundary condition in vertical symmetry plane
Gaussian bunch, sigma=2 mm, 1 mm horizontal offset

Courtesy of A. Candel (SLAC)

T3P: Numerical Convergence