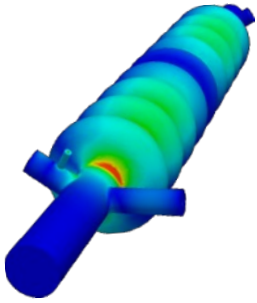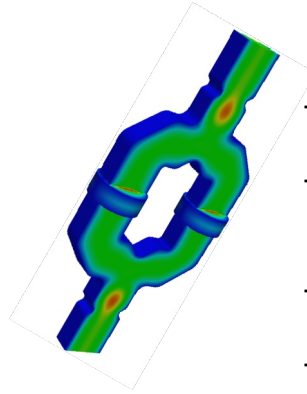# ACE3P Application Modules

## Omega3P *(Frequency domain)*

- Real eigenmodes in lossless or periodic cavities
- Complex eigenmodes in lossy or externally loaded cavities
- Mode damping in dielectric and ferrite materials
- Linear, quadratic and nonlinear eigensolvers
- Absorbing and PML boundary condition

S3P *(Frequency domain)*

- S-parameters of rf components and open structures
- Dielectric and ferrite materials
- Effects due to surface impedance on conductor walls
- Absorbing and PML boundary condition
- Boundary condition for thin coating layer

T3P *(Time domain)*
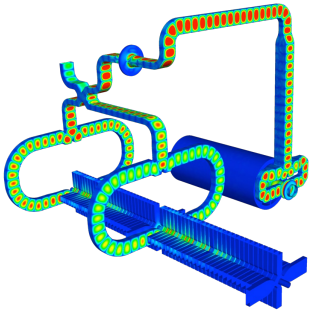
- Transient and wakefield from source excitation
- Moving window technique for broadband pulse and short beam propagation
- Absorbing and PML boundary conditions for far fields
- Impedance boundary condition for thin coating and lossy conductor walls

Track3P *(Particle tracking)*
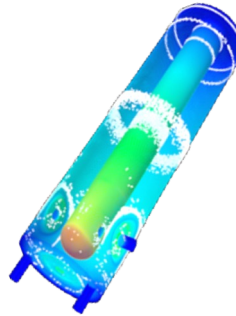
- Particle tracking code in external rf and static fields
- Multipacting and dark current in rf cavities and components
- Surface physics for field and secondary emissions
- Enhancement counter for multipacting

Pic3P *(Time domain)*
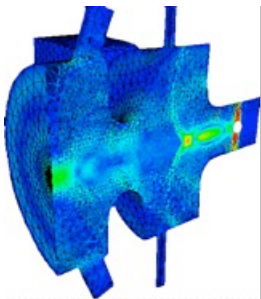
- Self consistent particle-in-cell (PIC) modeling of beam-cavity interactions in space-charge dominated devices
- User-specified particle emission model

TEM3P *(Multi physics)*
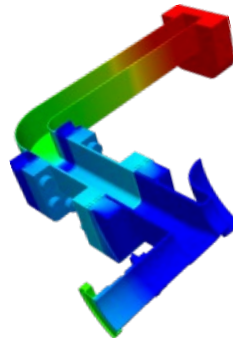
- Integrated EM, thermal and mechanical effects
- Nonlinear thermal conductivity and heat flux
- Convective boundary conditions
- Shell elements for surface coating
- Mechanical eigensolver and harmonic solver
- Transient analysis

Gun3P *(Static)*
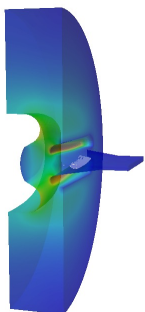
- DC gun modeling
- Electrostatic and magnetostatic solver
- Particle tracking
- Iterative procedure for convergence