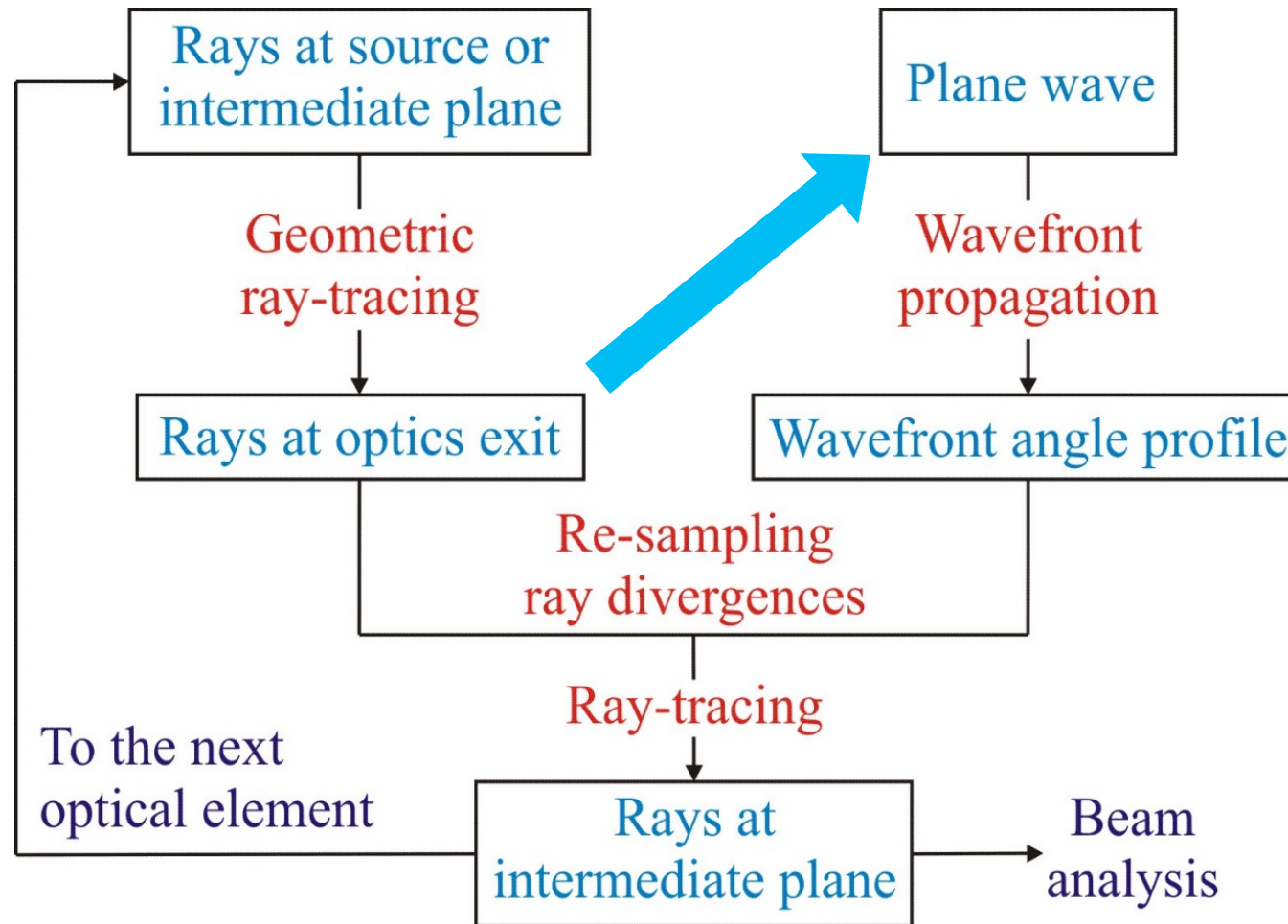# OASYS-ShadowOui-Hybrid

Xianbo Shi
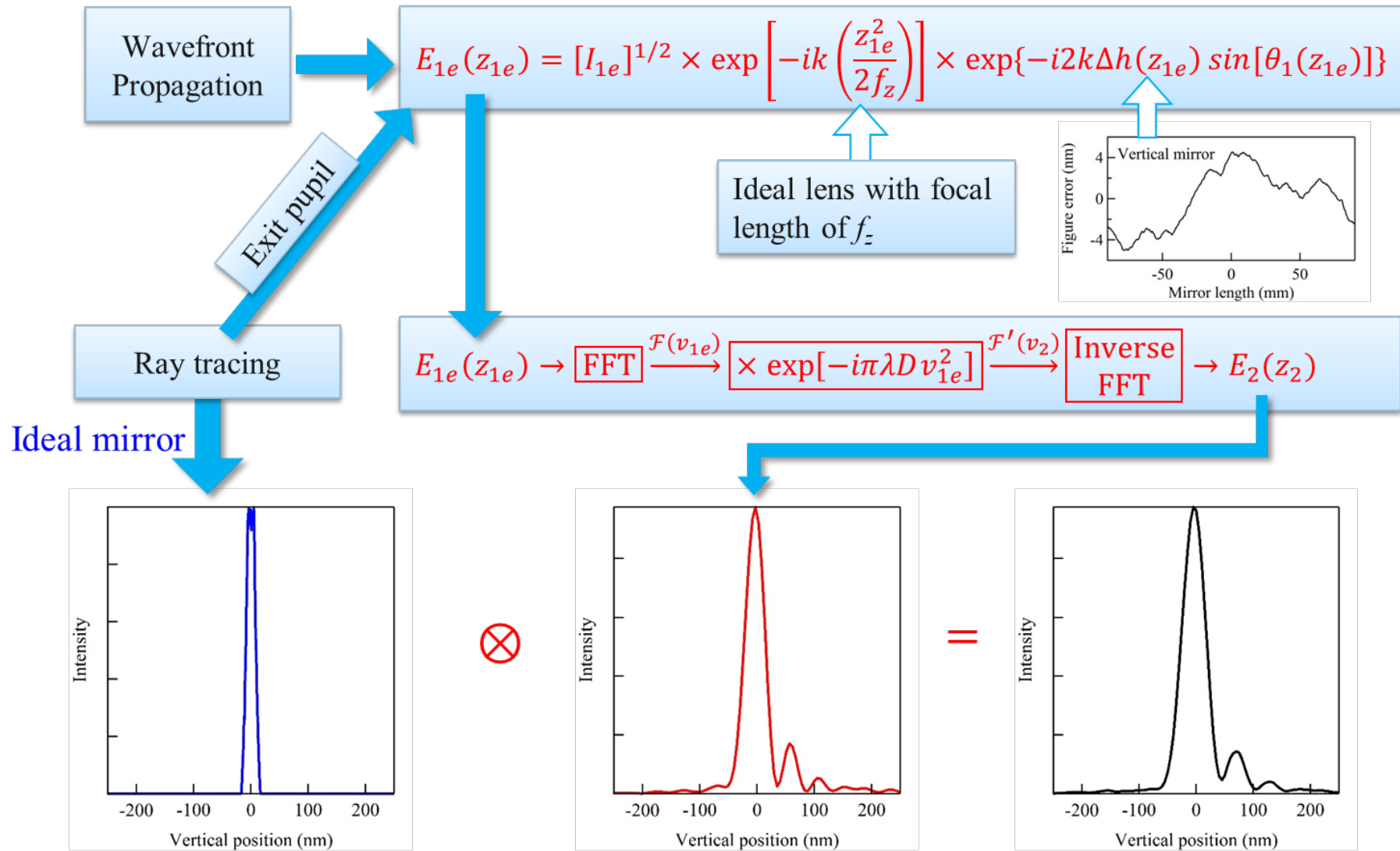
Hybrid method: combining ray-tracing and wavefront propagation

Iterative, valid in far-field approxima[

Hybrid method: combining ray-tracing and wavefront propagation

Wavefront Propagation

Exit pupil

Ray tracing

$$E_{1e}(z_{1e}) = [I_{1e}]^{1/2} \times \exp\left[-ik\left(\frac{z_{1e}^2}{2f_z}\right)\right] \times \exp\{-i2k\Delta h(z_{1e})\, sin[\theta_1(z_{1e})]\}$$

Ideal lens with focal length of f_z

$$E_{1e}(z_{1e}) \rightarrow \boxed{FFT} \xrightarrow{\mathcal{F}(v_{1e})} \boxed{\times \exp[-i\pi\lambda D v_{1e}^2]} \xrightarrow{\mathcal{F}'(v_2)} \boxed{\begin{array}{c}\text{Inverse}\\ \text{FFT}\end{array}} \rightarrow E_2(z_2)$$
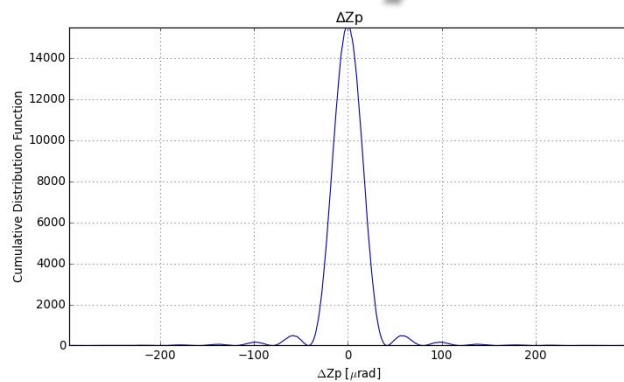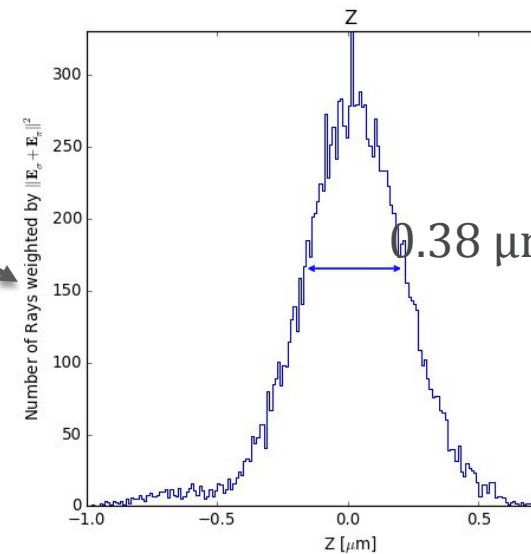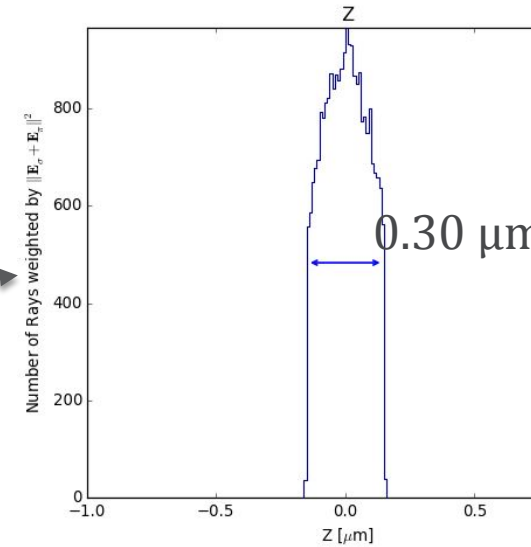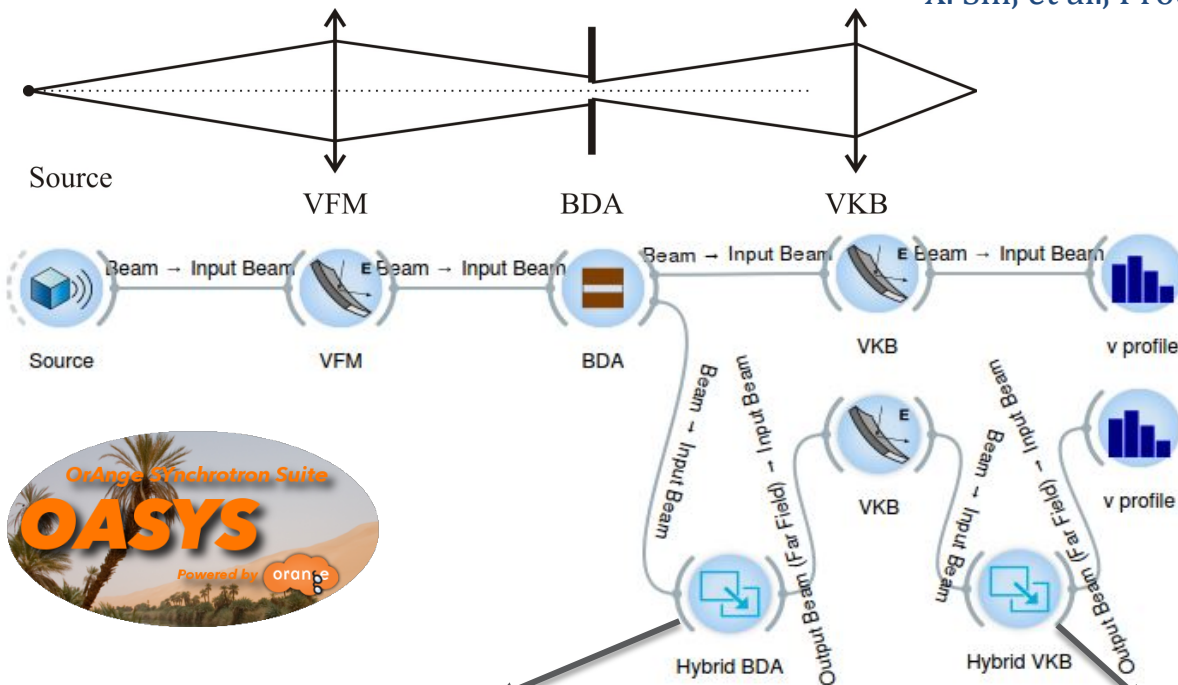
Ideal mirror

$\otimes$ $=$

Kirchhoff tangent plane + paraxial approximation

SHADOW-HYBRID in OASYS

X. Shi, et al., J. Synchrotron Rad. 21, 669 (2014).
X. Shi, et al., Proc. SPIE 9209, 920911 (2014).
X. Shi, et al., Proc. SPIE 9209, 920909 (2014).

Example