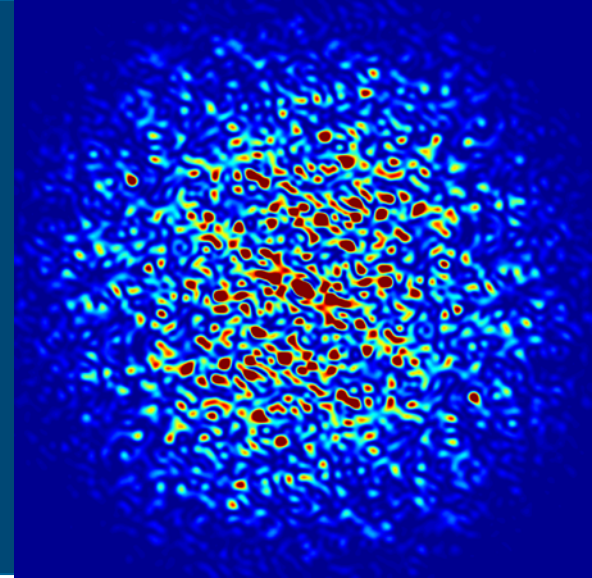


Introduction to OASYS



Luca Rebuffi (ANL)

Second OASYS School
APS-ANL, Lemont, IL

December 11-13, 2019

Introduction to OASYS

In the next years most of the major synchrotron radiation facilities around the world will upgrade to 4th-generation

Diffraction Limited Storage Rings

Multi-bend-achromat technology

Increased brilliance

Increased coherence

a huge
challenge
for the optics physicists!!!!

Introduction to OASYS

Computer simulation of light sources and optical components is a mandatory step in the design and optimization of synchrotron and FEL radiation beamlines

different codes for numerical simulations are available, implementing different physical approaches

RAY-TRACING

ShadowOui

RAY

XRT

McXtrace

**WAVEFRONT
PROPAGATION**

SRW

PHASE

WISE

Introduction to OASYS

APIs tend to be complementary because of the physical models

the APIs and their graphical interfaces of the software are different and can not be interchanged

Need to use not only a single but also both of the physical approaches in a compatible mode

easy and efficient comparison of their results



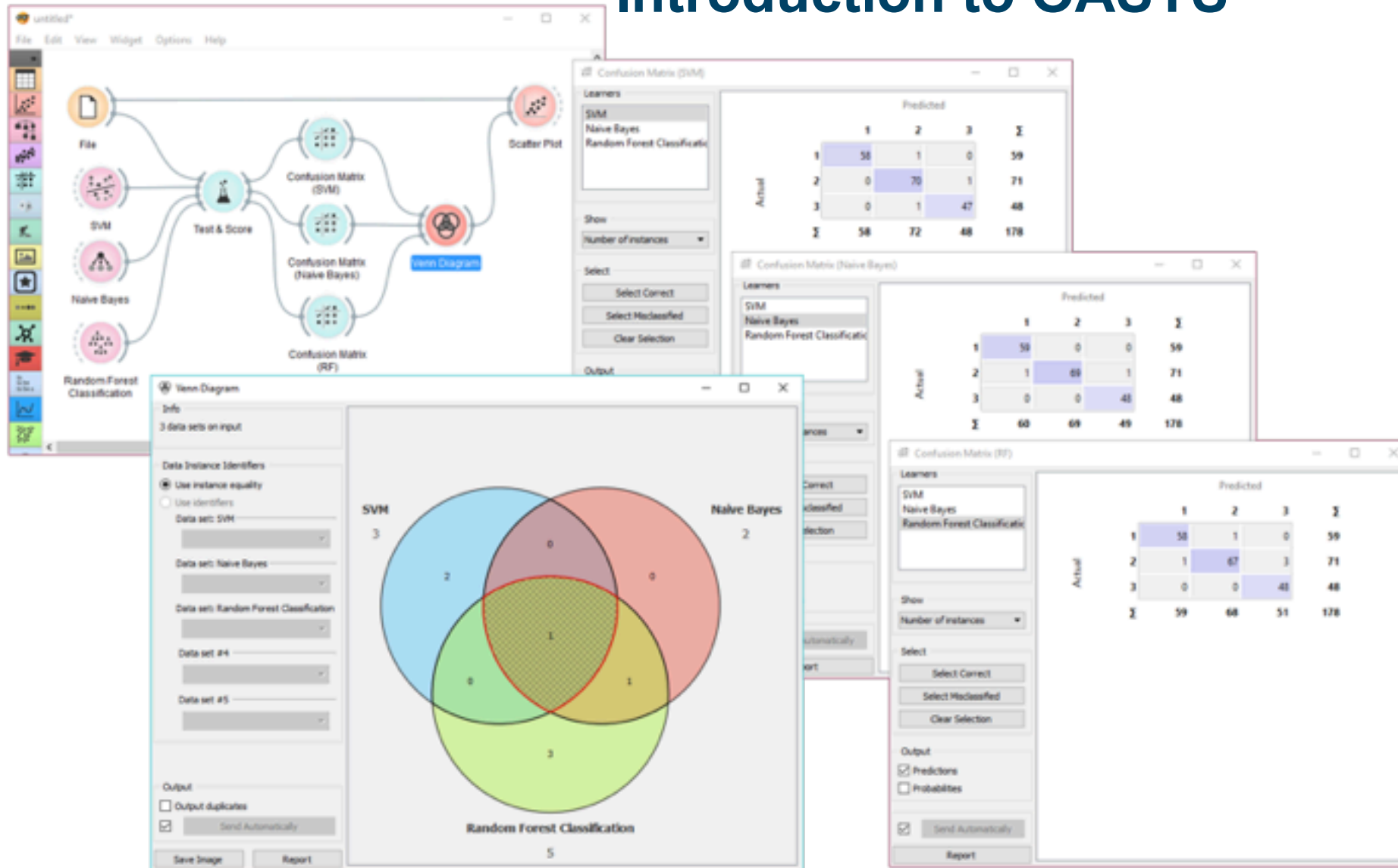
standardization and definition
of a common data format for describing
synchrotron radiation facilities and beamlines

Introduction to OASYS



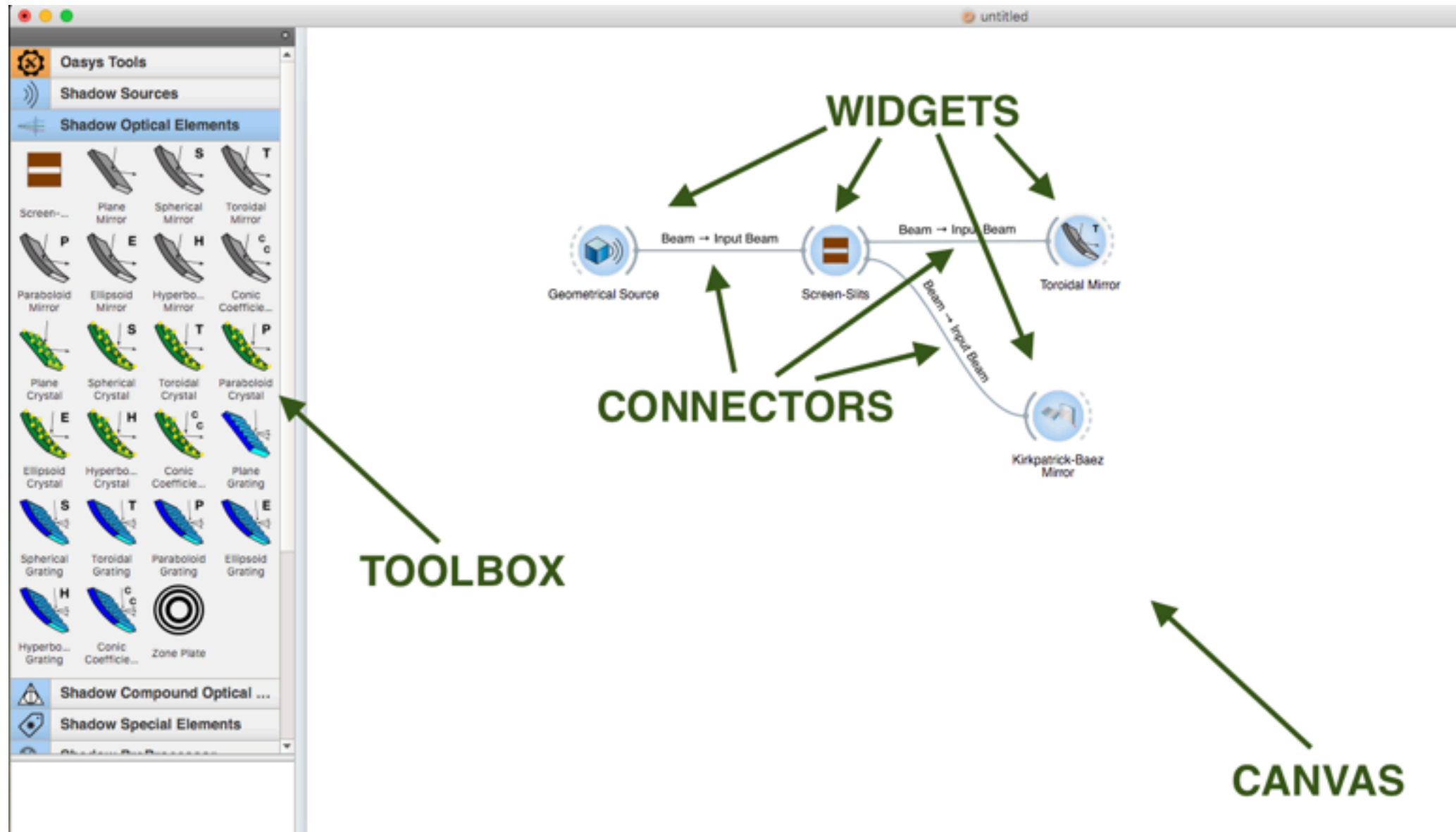
- ✓ OASYS = OrAnge SYNchrotron Suite
- ✓ A common platform to build synchrotron-oriented User Interfaces *that communicate*
- ✓ The upper layer of the application presented to the user

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Demšar, J., Curk, T., and Erjavec, A. "Orange: Data Mining Toolbox in Python," Journal of Machine Learning Research 14, 2349–2353 (2013).

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Introduction to OASYS



OASYS (OrAnge SYnchrotron Suite) Multiple tools in the same environment



L. Rebuffi & M. Sanchez del Rio, Proc. SPIE 10388, 103880S (2017)

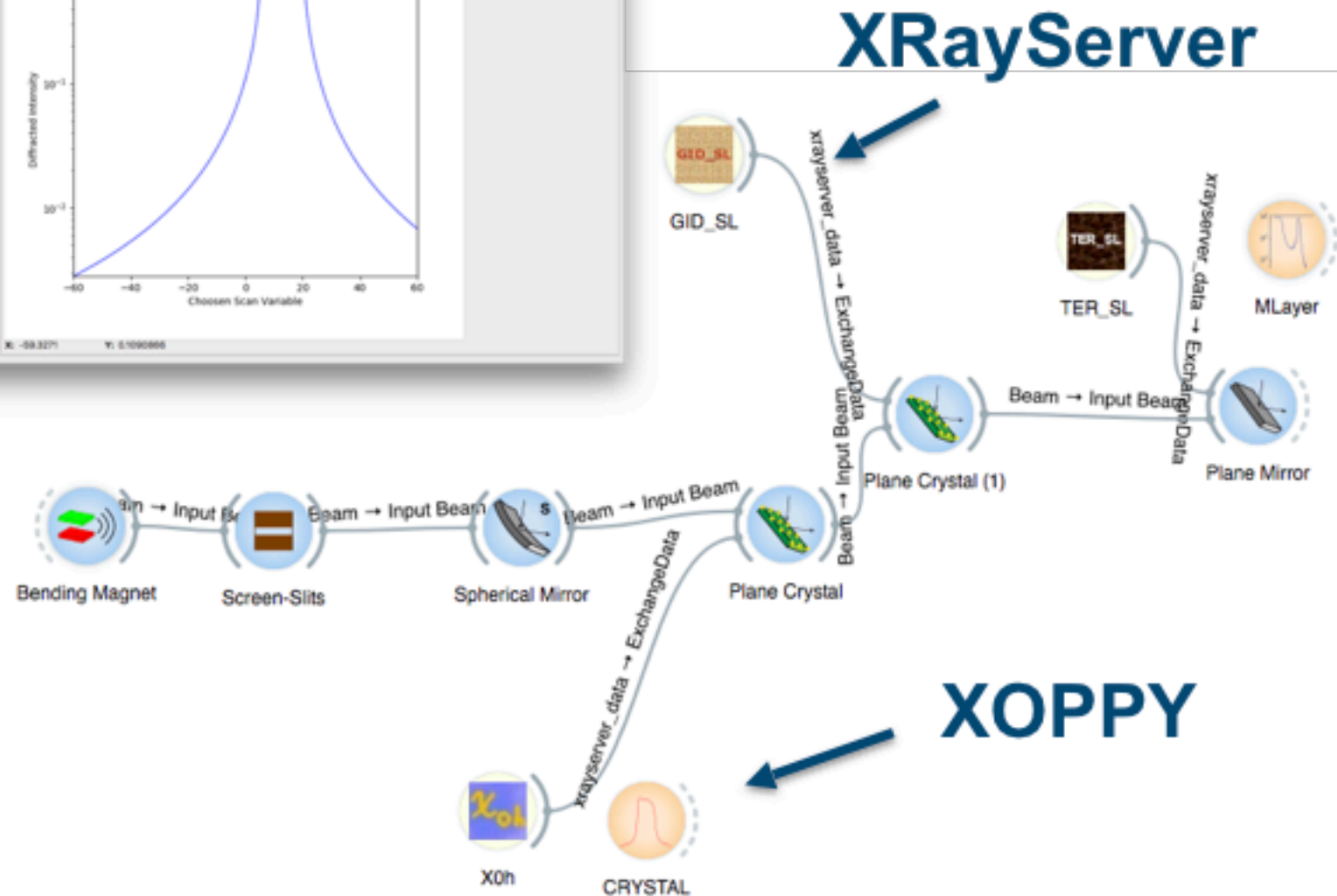
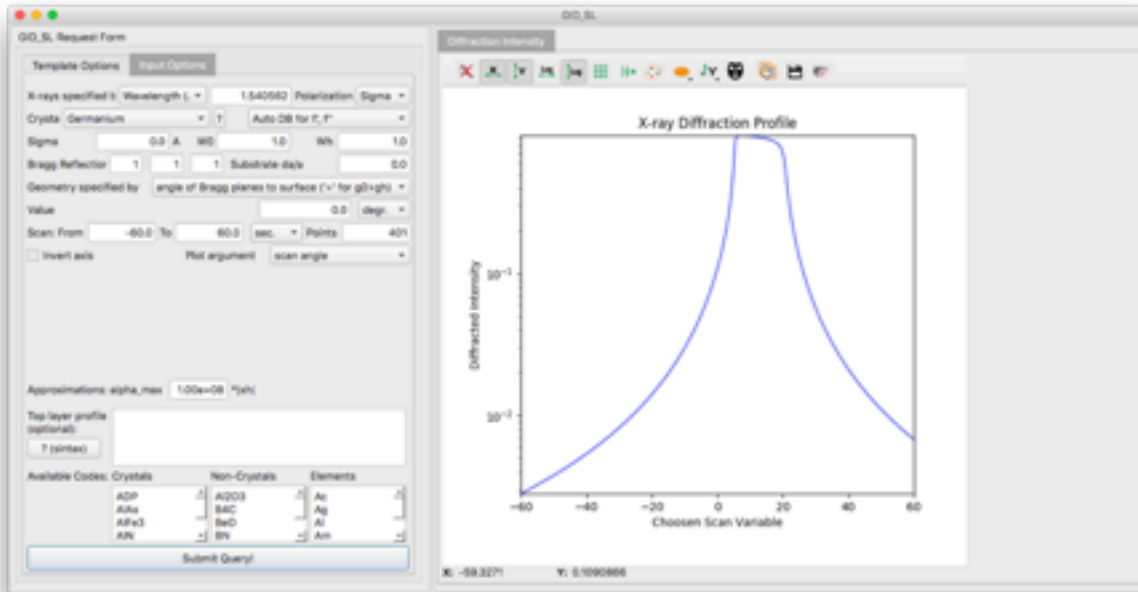
X. Shi et al., J. Synchrotron Rad. 21, 669 (2014)

L. Rebuffi & M. Sanchez del Rio, J. Synchrotron Rad. 23, 1357 (2016)

M. Sanchez del Rio et al., J. Synchrotron Rad. 23, 665 (2016)

<https://www.aps.anl.gov/Science/Scientific-Software/OASYS>

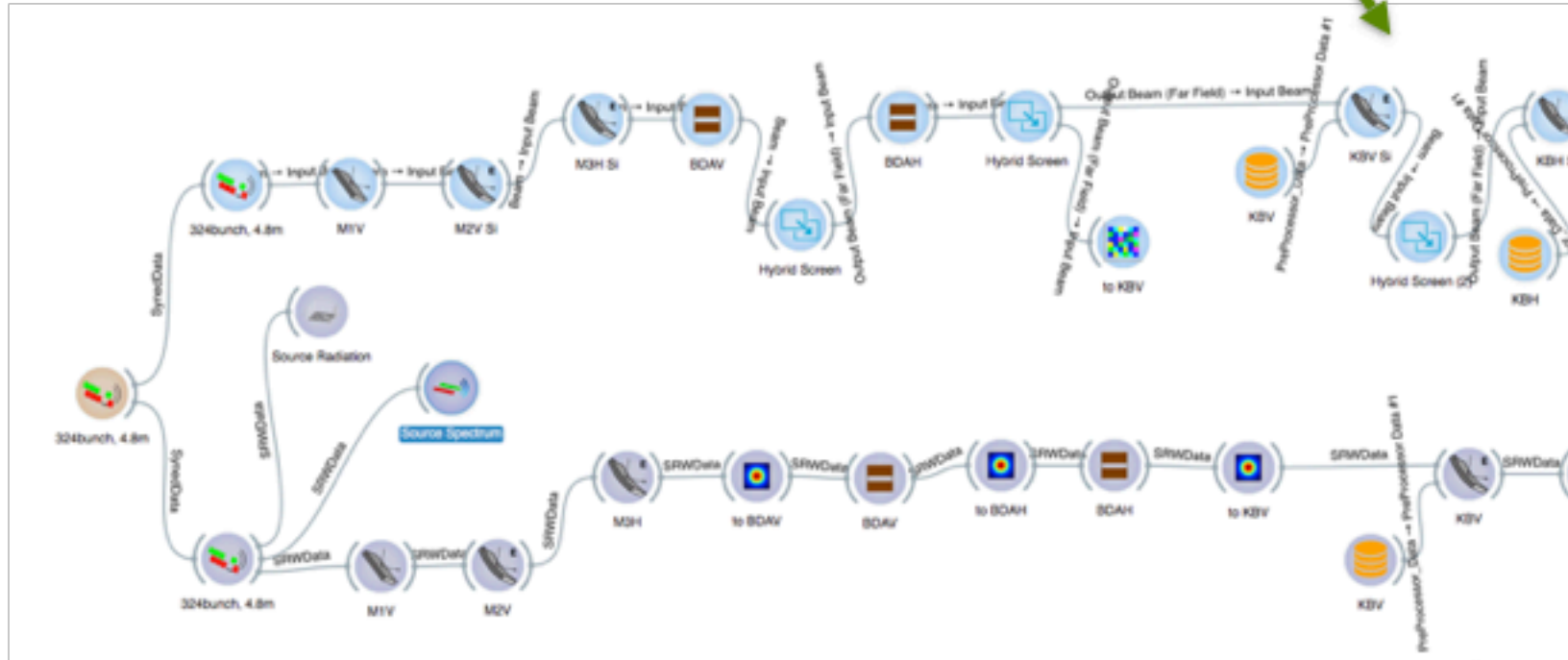
Introduction to OASYS



Introduction to OASYS

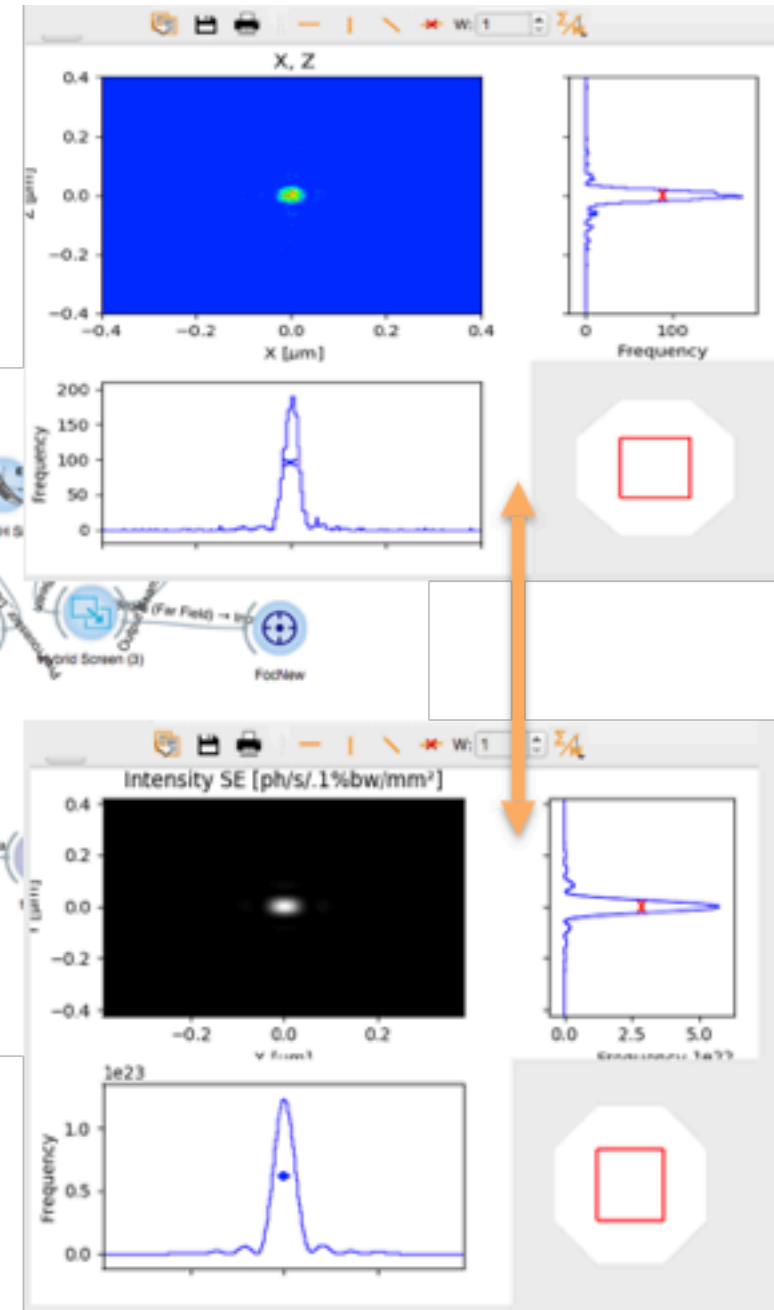
OASYS (OrAnge SYnchrotron Suite)
Multiple tools in the same environment

SHADOW



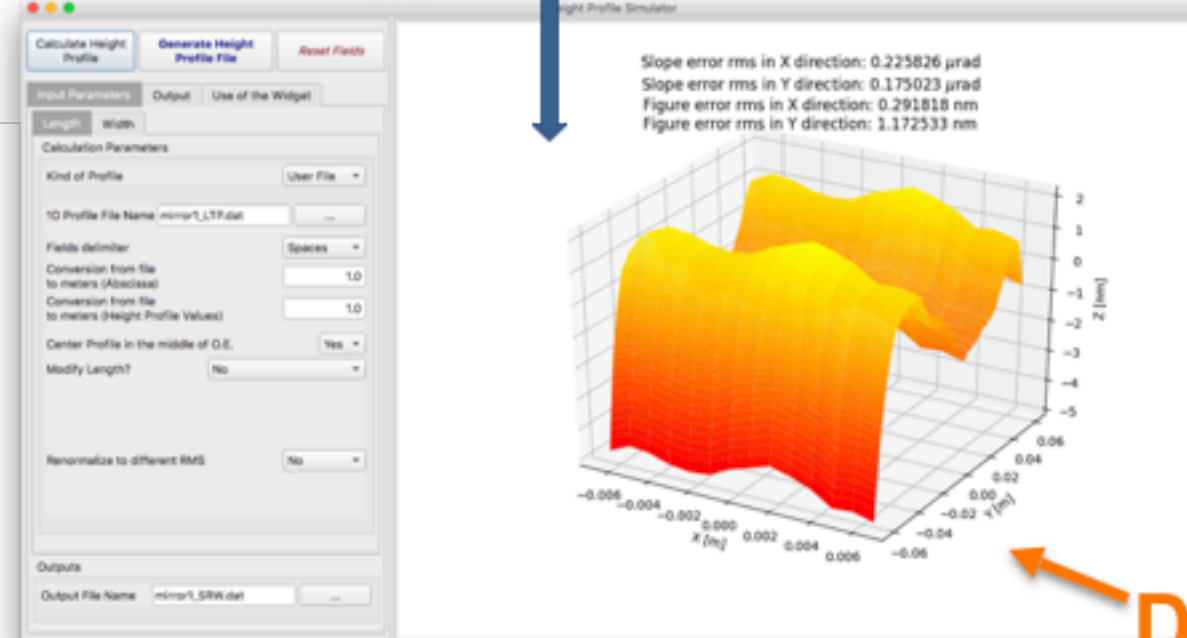
Compare and Benchmark Results

SRW



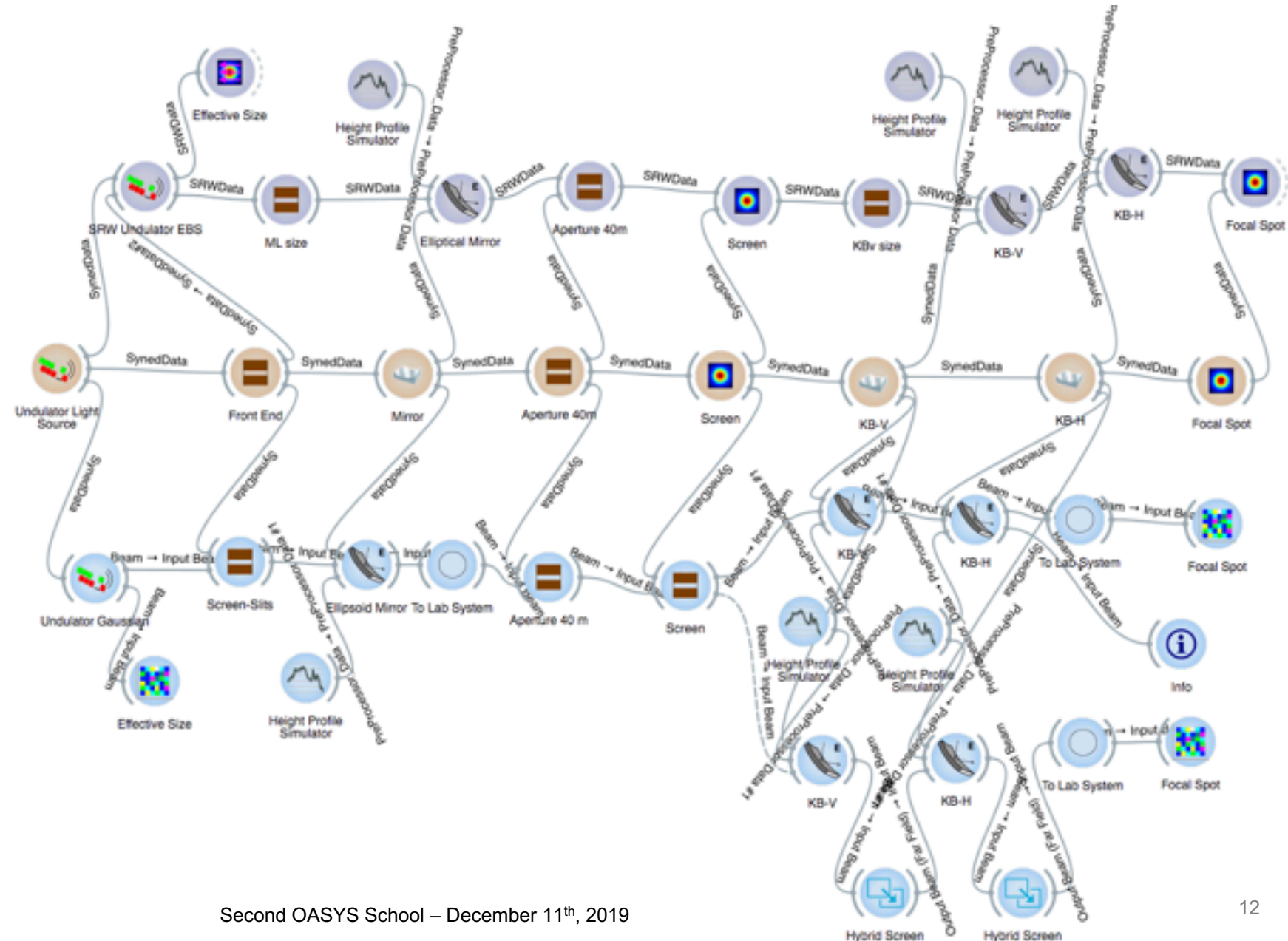
L. Rebuffi & M. Sanchez del Rio, Proc. SPIE 10388, 1038808 (2017)

Adding Realistic Features



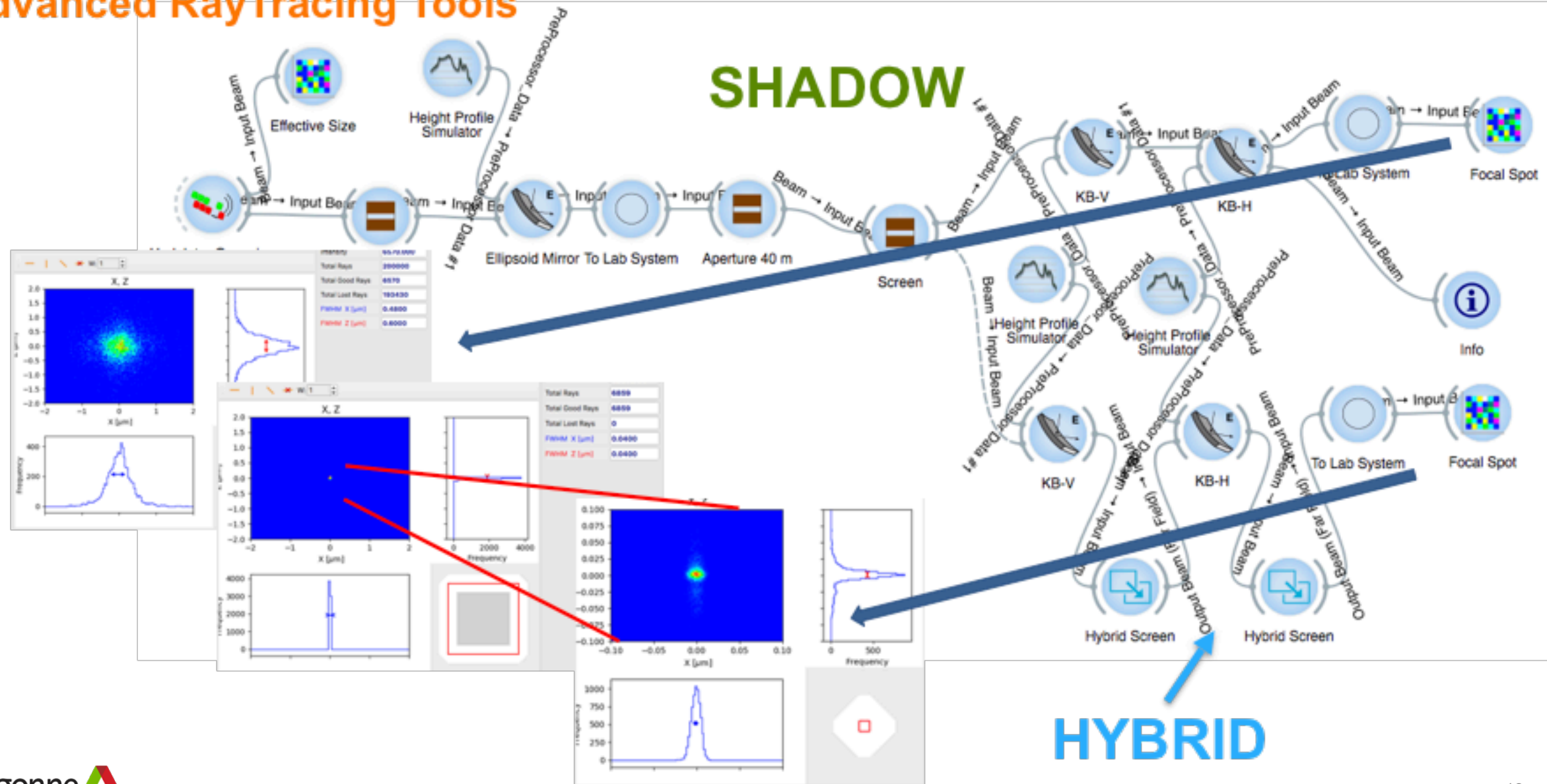
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Interoperability!



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Advanced RayTracing Tools



References

Official Web Page

<https://www.aps.anl.gov/Science/Scientific-Software/OASYS>

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M. Sanchez del Rio, L. Rebuffi, J. Demšar, N. Canestrari and O. Chubar, *A proposal for an open source graphical environment for simulating X-ray optics*, Proc. SPIE 9209, 92090X (2014)

X. Shi, R. Reininger, M. Sanchez del Rio, L. Assoufid, *A hybrid method for X-ray optics simulation: combining geometric ray-tracing and wavefront propagation*, J. Synchrotron Rad. 21, 669 (2014)

X. Shi, R. Reininger, M. Sanchez del Rio, J. Qian, L. Assoufid, *X-ray optics simulation and beamline design using a hybrid method: diffraction-limited focusing mirrors*, Proc. SPIE, 9209, 920909 (2014)

M. Sanchez del Rio, D. Bianchi, D. Cocco, M. Glass, M. Idir, J. Metz, L. Raimondi, L. Rebuffi, R. Reininger, X. Shi, F. Siewert, S. Spielmann-Jaeggi, P. Takacs, M. Tomasset, T. Tonnessen, A. Vivo and V. Yashchuk, *DABAM: an open-source database of X-ray mirrors metrology*, J. Synchrotron Rad. 23 (2016).

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Thank you!