Sirepo: a web-based interface for physical optics simulations – its deployment and use at NSLS-II

Maksim S. Rakitin[a], Oleg Chubar[a], Paul Moeller[b,c], Robert Nagler[b], David L. Bruhwiler[b]

[a]NSLS-II, Brookhaven National Laboratory, Upton, NY, USA 11973
[b]RadiaSoft LLC, 1348 Redwood Avenue, Boulder, CO, USA 80304 USA
[c]Bivio LLC, 4800 Baseline Rd., #E-104-336, Boulder, CO, USA 80303-2643

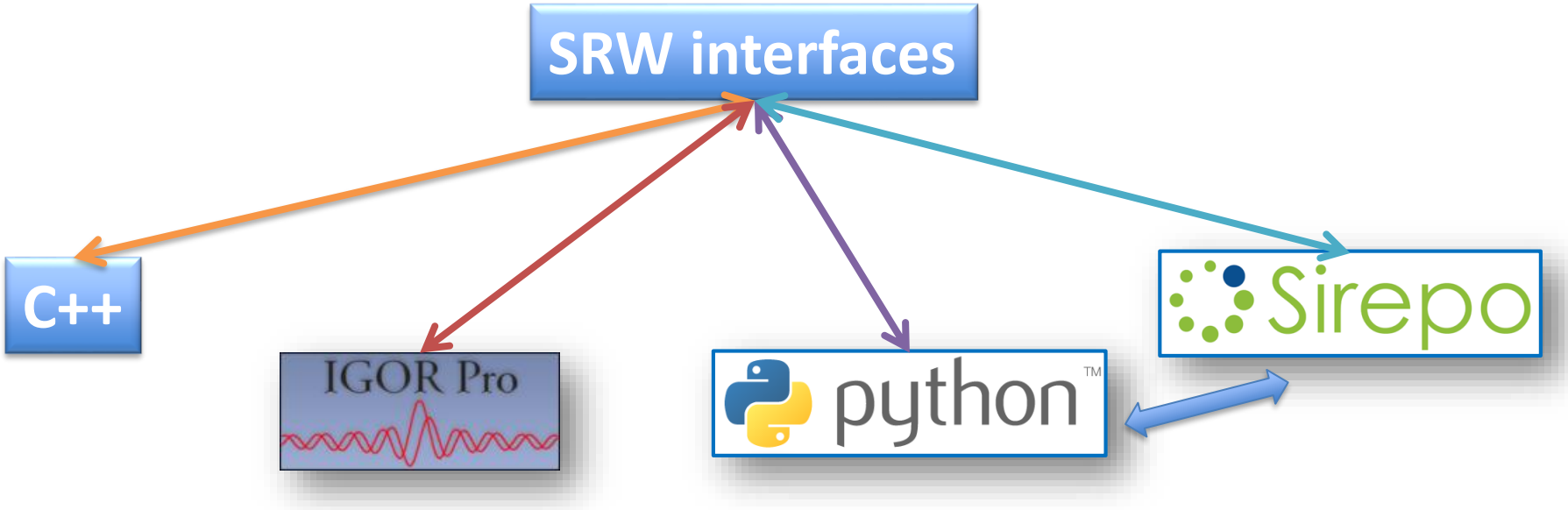
Outline

- Overview of Sirepo:
  - Sirepo & SRW
  - Distribution of Sirepo

- Demonstration of Sirepo

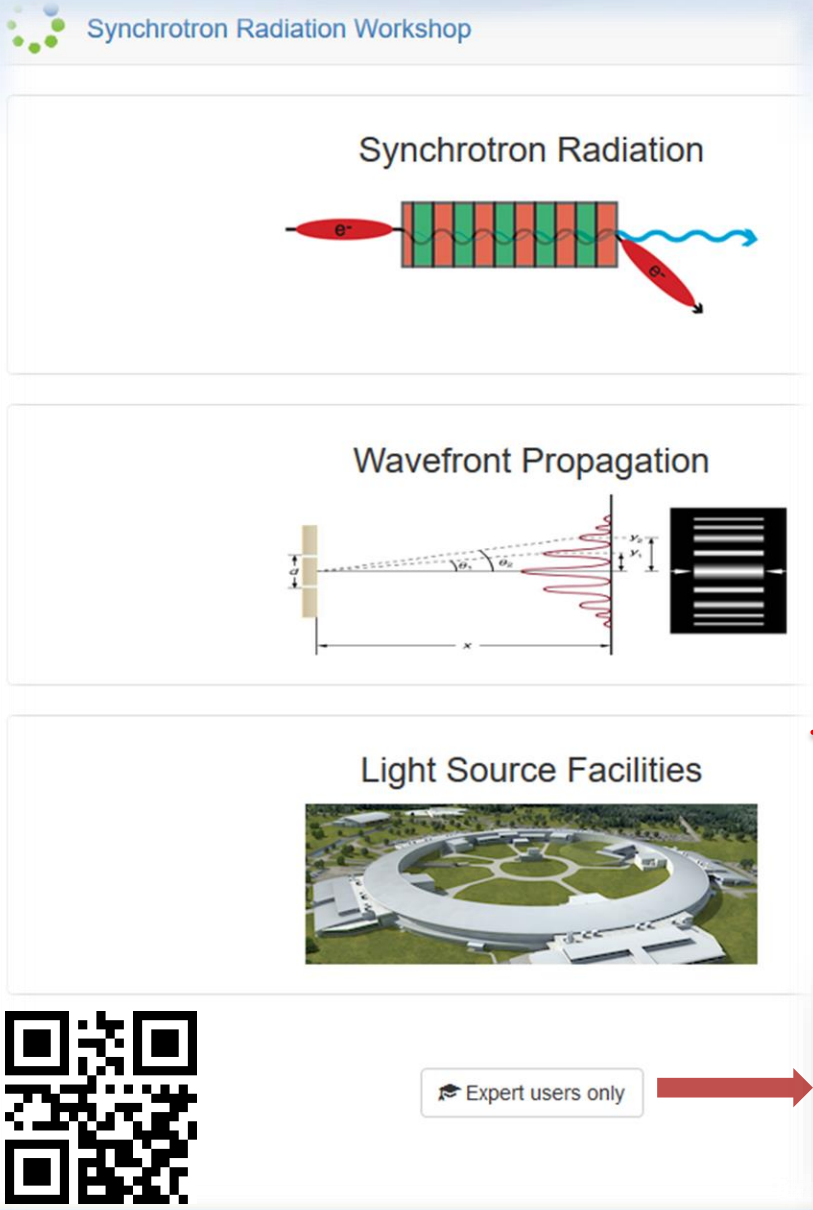
Sirepo & SRW

- **SRW (Synchrotron Radiation Workshop)** – allows to simulate synchrotron radiation and wavefront propagation through beamline optics
- SRW is written in C++ and has several interfaces
- **Sirepo** – an open-source Python/JavaScript framework for cloud computing, developed in collaboration with RadiaSoft LLC within SBIR project



Concept of "Virtual Beamline"

Distribution of Sirepo



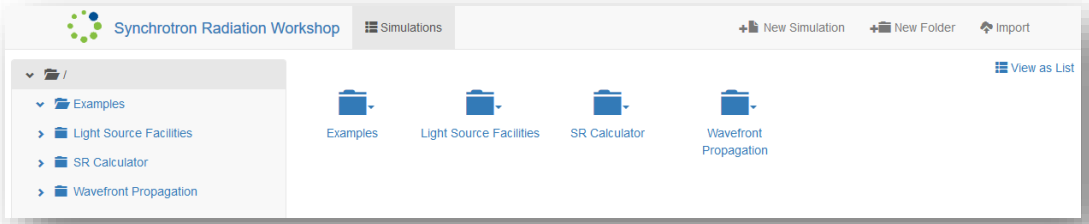
Distribution:

- **Source code:**
  - https://github.com/ochubar/SRW
  - https://github.com/radiasoft/sirepo
- **Docker containers:**
  https://hub.docker.com/r/radiasoft/sirepo/tags/
- **Vagrant boxes:**
  https://atlas.hashicorp.com/radiasoft/boxes/sirepo

Servers:

https://beta.sirepo.com/light – globally available
https://expdev.nsls2.bnl.gov/light – behind BNL firewall
http://nsls2expdev1.bnl.gov/light – behind BNL firewall

http://jupyter.radiasoft.org – Jupyter/IPython server



Demonstration of Sirepo

Summary:

- A new user-friendly web-interface Sirepo for portable reproducible SRW simulations developed in collaboration with RadiaSoft LLC and deployed at NSLS-II
- Virtual beamlines deployed: NSLS-II CHX, SMI, SRX, HXN, FMX, ESM, and LCLS-SXR
- Optical elements for “Virtual Beamline” implemented
- Real 1D/2D-mirror profiles can be used for SRW/Sirepo simulations
- Dynamic access to X-ray optics material properties from community databases implemented
- Advanced import-export features can be employed to exchange simulations
- GitHub credentials can be used to authenticate Sirepo servers

Acknowledgements

Experiment development:
Oleg Chubar

David Bruhwiler
Robert Nagler
Paul Moeller

Elaine DiMasi
Mikhail Zhernenkov

Andrei Fluerasu
Lutz Wiegart
Yugang Zhang

SRX team:
Juergen Thieme
Garth Williams
Karen Chen-Wiegart

ESM team:
Elio Vescovo
Andrew Walter

Metrology group:
Mourad Idir
Konstantine Kaznatcheev
Lei Huang

ID group:
Charles Kitegi
Dean Hidas
Marco Musardo

Julien Lhermitte