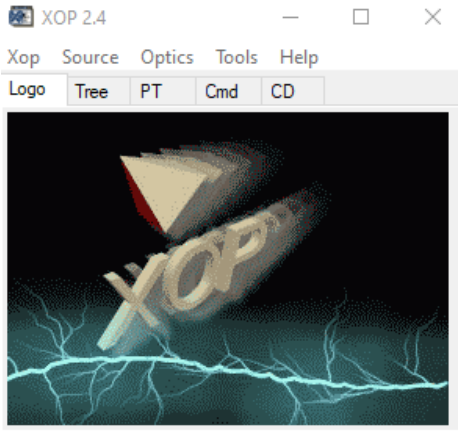
XOP – STATUS



ROGER DEJUS
Control Account Manager for
Insertion Devices for APS Upgrade

December 11, 2019
Argonne, IL

Outline

- History and Scope
- Current distribution (v2.4)
- Overview
- Examples
- References
- Summary

History and Scope

- Developed during the early 1990s to suit local needs at the ESRF and the APS (efforts officially merged 1995; now 25 years in the making … end of life)
- XOP v2.0: 1,000 CD-ROMs distributed (400 registered users)
- Front-end graphical user interface for computer codes of different origins and different languages for the synchrotron radiation community (written in the licensed Interactive Data Language IDL)
  - Modelling of x-ray sources
  - Characterization of optical elements (mirrors, filters, crystals, multilayers, etc.) and their effect on sources (“pipes” via files)
  - Multipurpose visualizations and data analyses
  - Optional plug-in of external software packages “extensions” expands the functionality of XOP

Current XOP Distribution v2.4 (2015)

- Used worldwide by synchrotron radiation facilities (and many others) and has been crucial for beamline designers and users for over a decade. The current version runs on Unix, Linux, Mac OS X, and Windows.
- The graphical user interface and many modules of the code are written in IDL, which is subject to U.S. Export Control and is categorized under Export Control Classification Number (ECCN) 5D002 (as of IDL v8.0). As such, it can only be distributed to users who have completed and submitted an application that is approved by the Argonne's Export Control process.
- Licensed since April 2015 with 2,029 application requests to date (10% denied)
- Licensed with IDL v8.3 embedded and good thru September 20, 2021 (no additional IDL embedding requests planned)
- Replaced by the OASYS software, which contains similar functionalities (codes) but also with enhancements and new codes for different applications

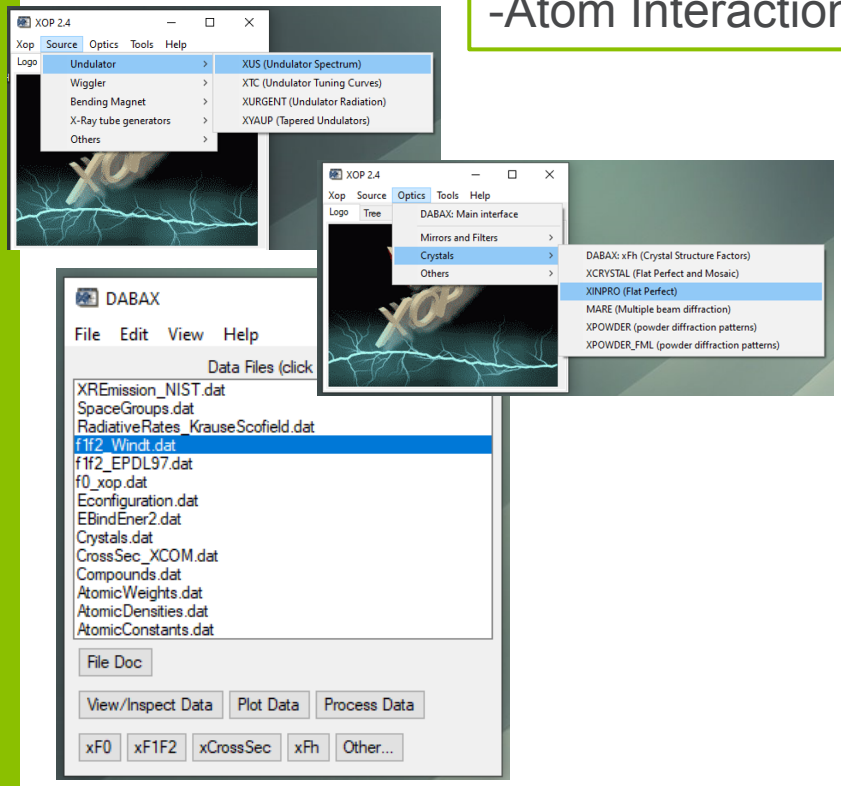
Overview

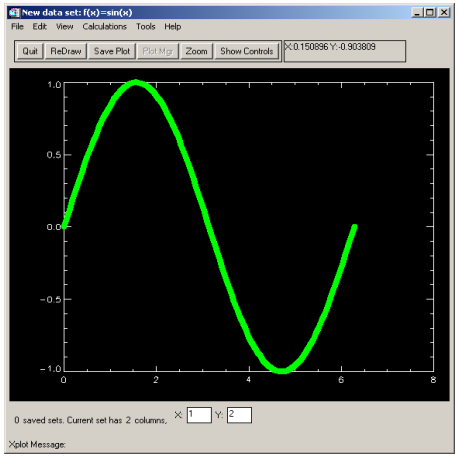
X-Ray Sources

X-Ray Optics and Photon -Atom Interactions

General Purpose Tools and Documentation

XOP Extensions

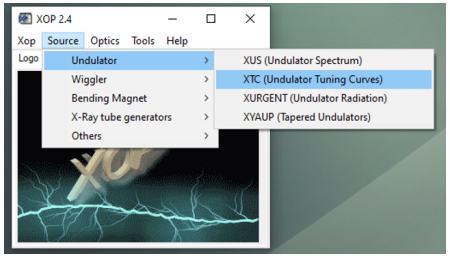




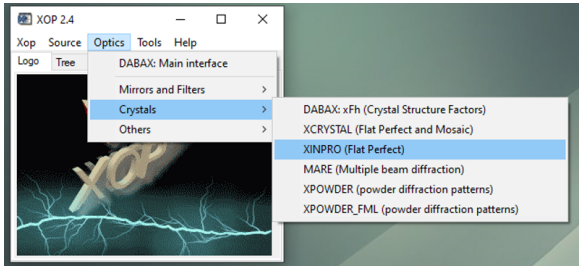
XPLOT

- SHADOWVUI
  - Interface to the SHADOW ray-tracing code (Cerrina et al.)
- IMD
  - Multilayer software (Windt)
- TOPO
  - Surface topography (Windt)

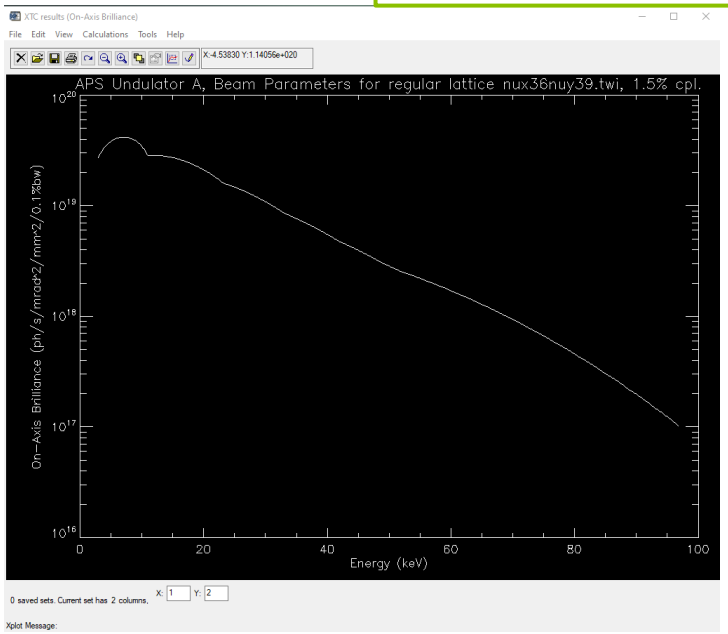
XOP Examples – XTC and XINPRO

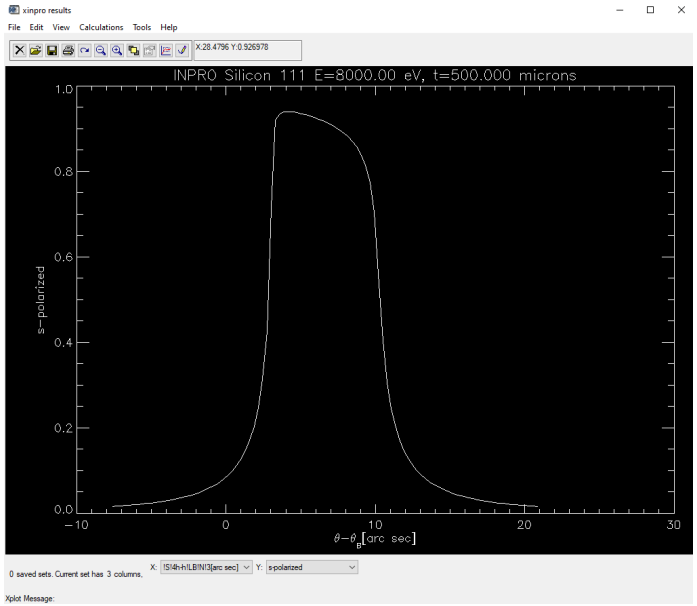


On-Axis Brilliance Tuning Curves (XTC)

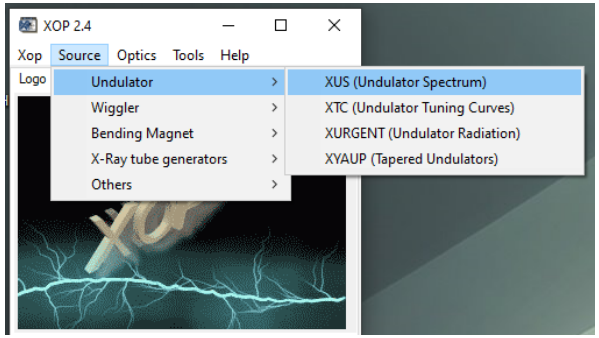


Si X-Ray Crystal Diffraction Profile (XINPRO)

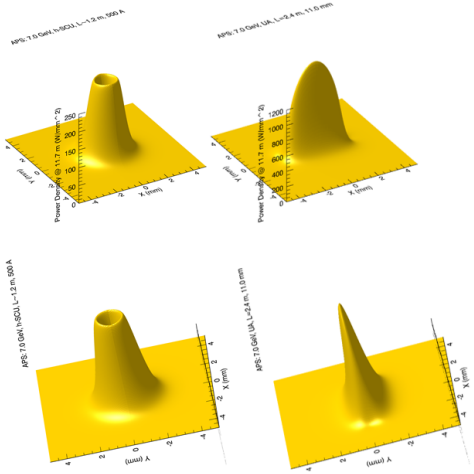




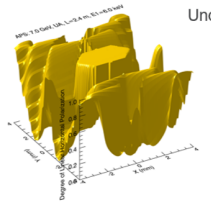
XOP Examples – XUS: Helical SCU vs. APS Undulator A



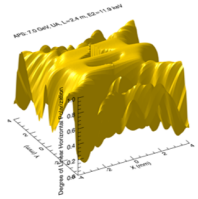
Power Density h-SCU left, UA right



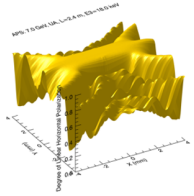
Undulator A



1st Harmonic (6 keV)



2nd Harmonic (12 keV)

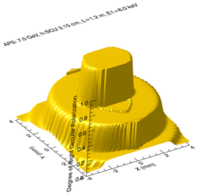


3rd Harmonic (18 keV)

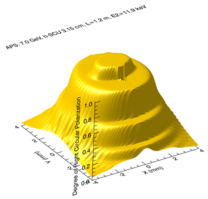
- Ky=1.635
- Distance 26.5 m
- General appearance correct – sharp edges not

UA Horizontal Linear Polarization

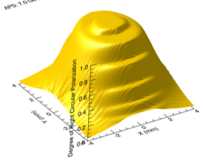
h-SCU



1st Harmonic (6 keV)



2nd Harmonic (12 keV)

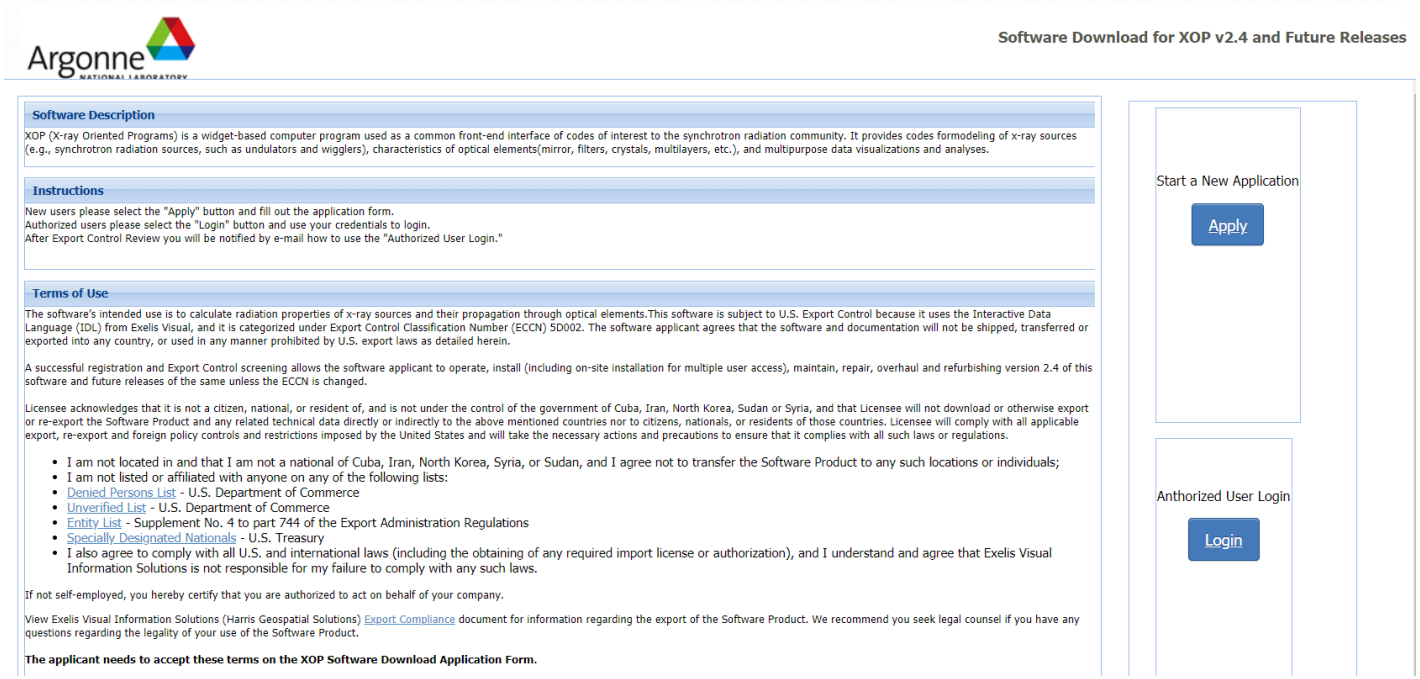


3rd Harmonic (18 keV); very low flux (not important)

- Kx=Ky=1.20
- Distance 26.5 m
- General appearance correct – sharp edges not

h-SCU Circular Polarization

XOP Request for Downloads



Argonne NATIONAL LABORATORY

Software Download for XOP v2.4 and Future Releases

Software Description

XOP (X-ray Oriented Programs) is a widget-based computer program used as a common front-end interface of codes of interest to the synchrotron radiation community. It provides codes formodeling of x-ray sources (e.g., synchrotron radiation sources, such as undulators and wigglers), characteristics of optical elements(mirror, filters, crystals, multilayers, etc.), and multipurpose data visualizations and analyses.

Instructions

New users please select the "Apply" button and fill out the application form.
Authorized users please select the "Login" button and use your credentials to login.
After Export Control Review you will be notified by e-mail how to use the "Authorized User Login."

Terms of Use

The software's intended use is to calculate radiation properties of x-ray sources and their propagation through optical elements.This software is subject to U.S. Export Control because it uses the Interactive Data Language (IDL) from Exelis Visual, and it is categorized under Export Control Classification Number (ECCN) 5D002. The software applicant agrees that the software and documentation will not be shipped, transferred or exported into any country, or used in any manner prohibited by U.S. export laws as detailed herein.

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Login

- https://beam.aps.anl.gov/apps/xop/

References

- Manuel Sánchez del Río and Roger J. Dejus "XOP v2.4: recent developments of the x-ray optics software toolkit", Proc. SPIE 8141, Advances in Computational Methods for X-Ray Optics II, 814115 (23 September 2011); https://doi.org/10.1117/12.893911

- https://www.aps.anl.gov/Science/Scientific-Software
- https://beam.aps.anl.gov/apps/xop/

- srio@esrf.fr or srio@lbl.gov
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