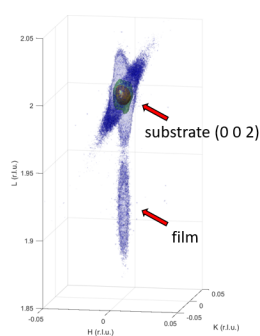




# Fast 3-dimensional reciprocal space imaging with laboratory X-ray diffraction: RSLab

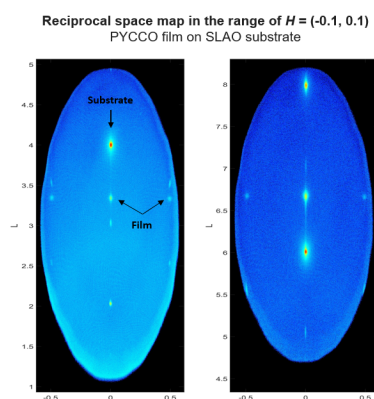
A software that adds fast 3D reciprocal space imaging capabilities to laboratory X-ray diffractometers with 2D detectors.

## 3D reciprocal space map construction



3D reciprocal space map of (0 0 2) Bragg peaks of SrTiO<sub>3</sub> thin-film on SrTiO<sub>3</sub> substrate

## Fast reciprocal space mapping



Reciprocal space map in the range of  $H = (-0.1, 0.1)$  PYCCO film on SLAO substrate

(Bruker d8 discover - 4 Hours)

## Technology ID

2021-290

## Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls  
Life Sciences/Research Tools  
Software & IT/End User Software  
Software & IT/Image & Signal Processing  
Software & IT/Open Source

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## Applications

- Software for X-ray diffractometers

## Overview

Researchers at the University of Minnesota have developed an innovative X-ray diffraction software that adds new analytical capabilities to commercial laboratory X-ray diffractometers equipped with 2-dimensional detectors. The software significantly enhances capabilities of compatible laboratory X-ray instruments, enabling research usually requiring access to synchrotron facilities. This software introduces the following new functions:

- Construct detailed 3-dimensional reciprocal space maps from multiple detector images,
- Perform wide reciprocal space mapping magnitudes faster than using traditional measurements
- Computationally emulates traditional measurements after experiments.

The software is designed to work for a variety of instruments from different vendors, such as Bruker and Rigaku (instrument configurations and data may be needed to add support to users' instruments).

## Key Features of RSLab<sup>TM</sup>

- Drastically improves capabilities and efficiencies of laboratory X-ray diffractometers via software without requiring any changes to the hardware
- Simplify experiment procedures
- 1D, 2D and 3D data analysis seamlessly integrated into a graphical user interface (GUI) program that run on laptop and desktop PC
- Automatic and semi-automatic data analyses
- Explore data and emulate scans after experiments

### **Software Specifications and System Requirements**

Language: .p code (MATLAB code) or .exe windows executable. Matlab or Matlab runtime (MCR) is required to run RSLab.

Hardware: Software configuration needs to be compatible with Hardware. Please reach out to yug@umn.edu for technical questions on this.

### **Phase of Development**

TRL: 7-8 Software will be available for download. Please inquire with Dr. Guichuan Yu (yug@umn.edu) for instrument compatibility and customization before download.

### **How to Download?**

This technology is now available for licensing. Interested non-profit organizations may download and use the software free of charge by executing the license agreement provided on the right panel. Please contact us for commercial needs.

### **Researchers**

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