HyperSpy Tutorial Session

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# Intro

## Brief development history

### EELSLab -> Francisco’s thesis project 2007 - 2012

### HyperSpy -> open source project 2012 – present

## Background motivation for Andy and Josh

## Overall philosophy

### Python library (explain how this enables/requires Numpy and SciPy libraries)

### Open data architecture

### Reproducible data analysis

### Open source development (add your own features)

# Working with HyperSpy

## Requirements and installation

## Ways of interacting

### Command Line

### Jupyter Notebook

### Spyder

### HyperSpyUI

## Where to get help?

### User guide

### Tutorials/demos

### Documentation

### Github issue tracker

### User group list/gitter chat

# The Signal Class

## Structure

## Flexibility

# Data I/O

## Available data readers

### Generic python data (maybe show scipy.io.loadmat for Matlab data)

### Gatan dm3 and dm4

### EDAX .spd and .spc

### FEI .emi and .ser

### Lispix .raw/.rpl

### Bruker .bcf

### .mrc for Tomography

## Lazy signals

## Output formats

### Intro to HDF5 format

### Mention some interchange formats (.rpl and .msa, primarily)

# XEDS Processing

## Separate demos for SEM-based and TEM-based data

## Basic processing (background removal, map extraction, etc.)

## Quantification

## Machine learning

### PCA denoising

### Unsupervised learning - NMF “phase mapping”

# EELS Processing

## Basic processing (background extraction, map extraction, etc.)

## Curve fitting

### Fine structure demo

# Extensibility

## 4D-STEM

## Chemical tomography

## Mixing HyperSpy with other processing pipelines

### Example of doing matrix factorization with AXSIA and importing back into HyperSpy