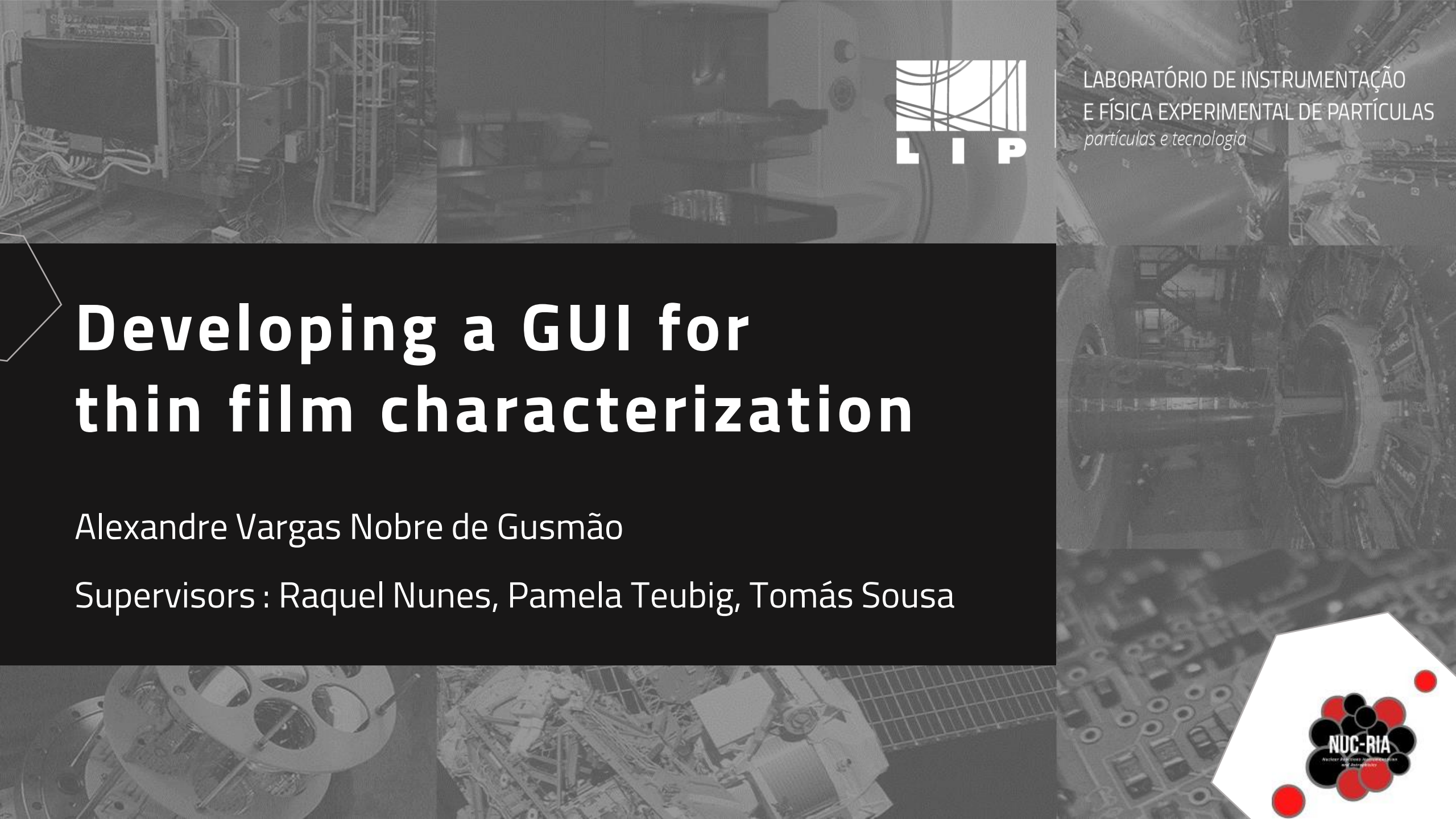


LABORATÓRIO DE INSTRUMENTAÇÃO
E FÍSICA EXPERIMENTAL DE PARTÍCULAS
partículas e tecnologia

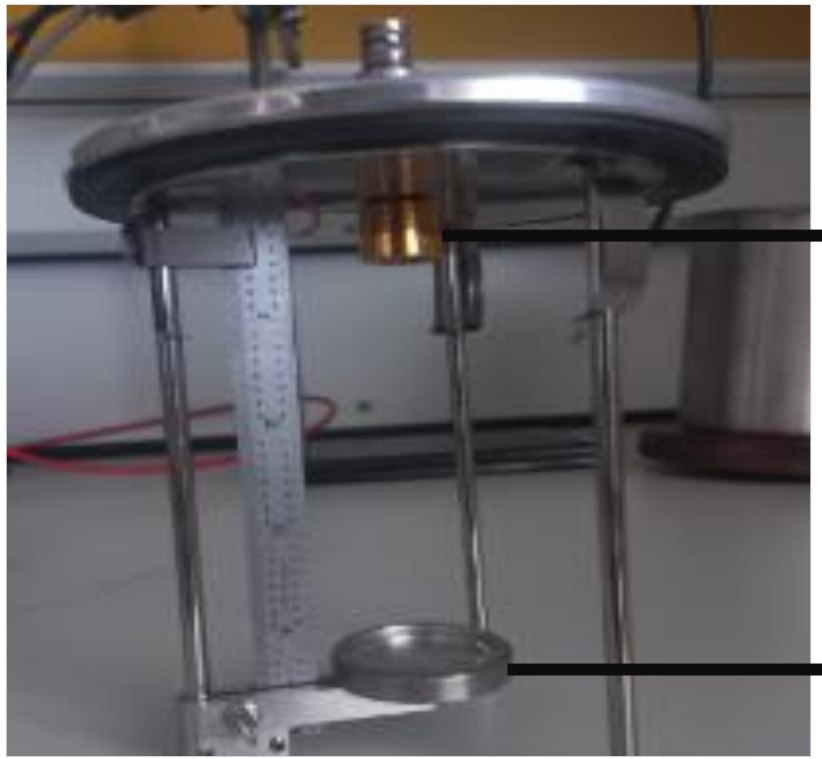
Developing a GUI for thin film characterization

Alexandre Vargas Nobre de Gusmão

Supervisors : Raquel Nunes, Pamela Teubig, Tomás Sousa

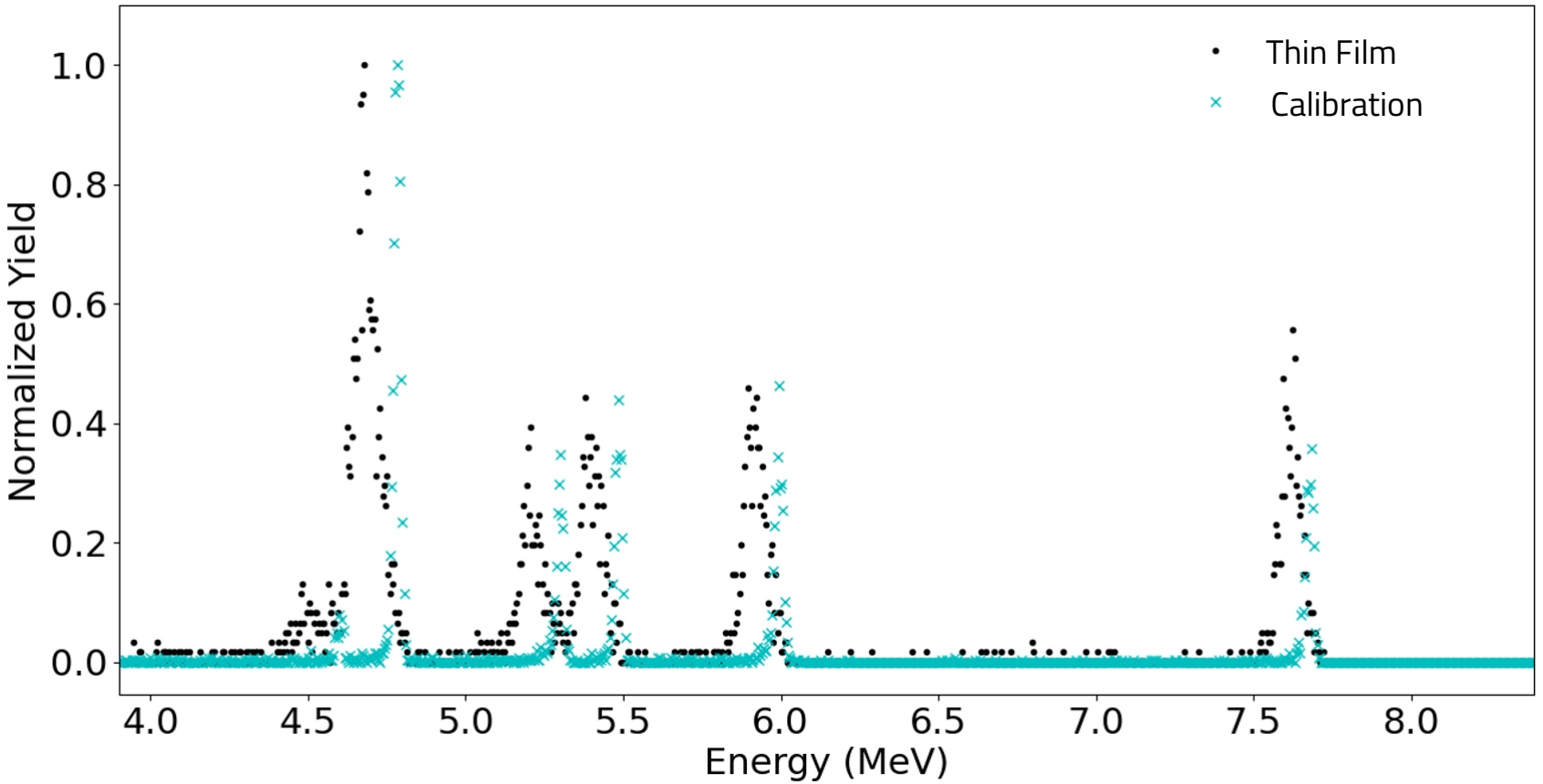
The Theory of AEL

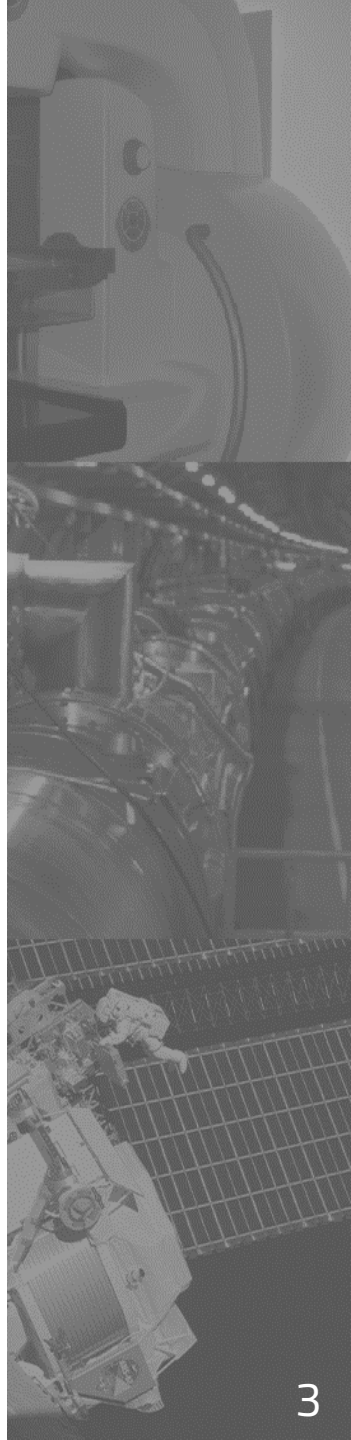
226Ra, 232U – Alpha Sources available at the Lab



The Theory of AEL

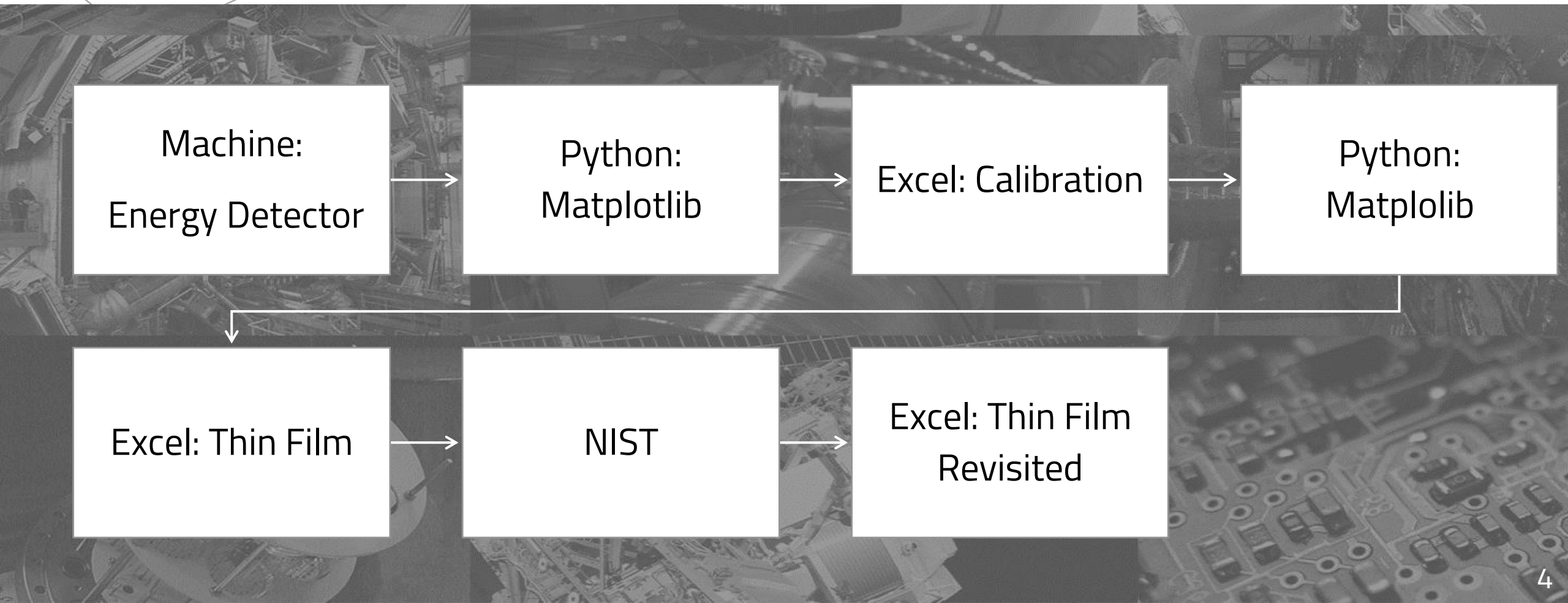
$$\Delta x \approx \int_{E_i}^{E_f} -\left(\frac{dE}{dx}\right)^{-1} dE \approx \sum_{E_k=E_i}^{E_f} \frac{\delta E}{S(E_k)} \quad \text{where } \delta E = E_{k+1} - E_k$$





THE PROBLEM

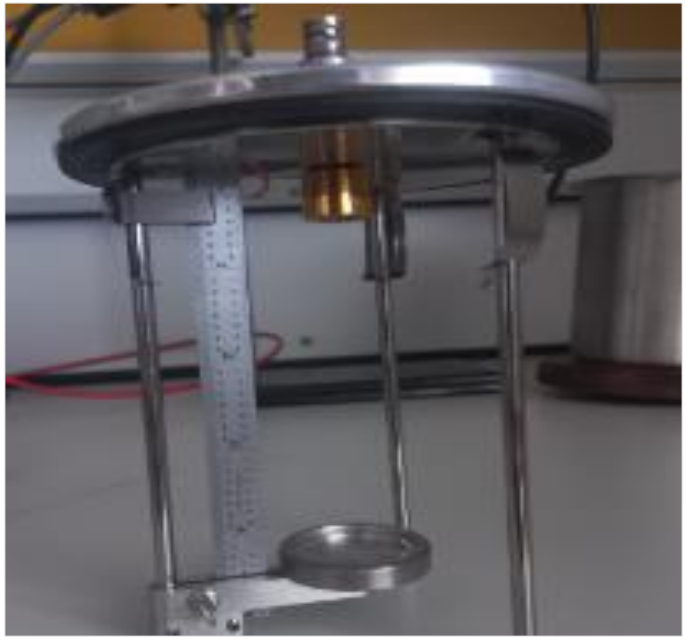
Characterization complete in these *7* steps!



THE SOLUTION

Characterization complete in *just* 2 steps!

Machine: Energy Detector

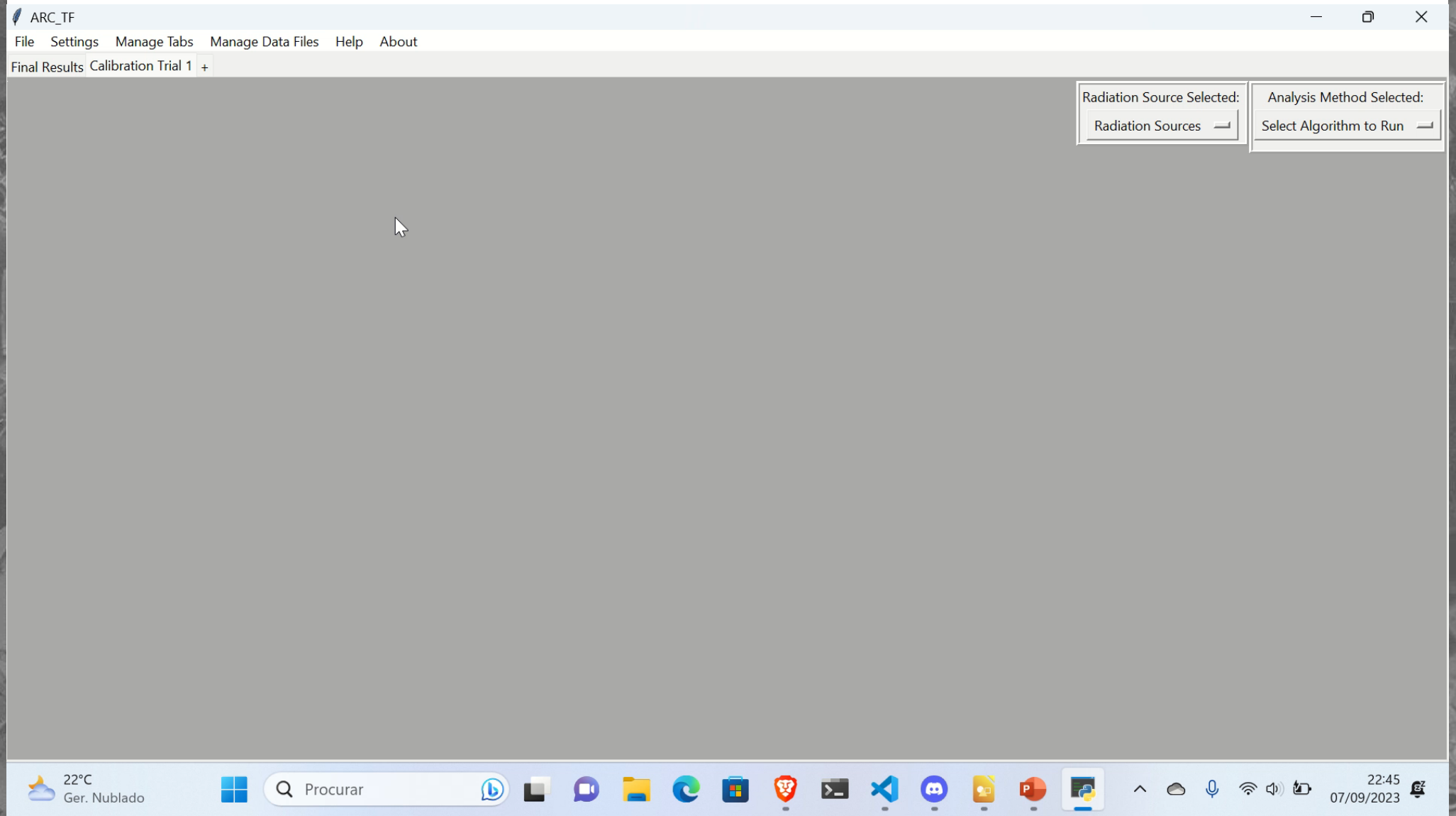


ARC-TF

```
2048  TabTracker = []
2049
2050  Energy_settings = tk.IntVar()
2051  Energy_settings.set(1000)
2052  Unit_settings = tk.DoubleVar()
2053  Unit_settings.set((10**9))
2054
2055  Channel_cut = tk.IntVar()
2056  Channel_cut.set(100)
2057
2058  Peak_Width = tk.IntVar()
2059  Peak_Width.set(35)
2060
2061  ############################################################
2062  Tabs.tab_change(1)
2063  Notebook.notebook.select(1)
2064
2065  os.mkdir('Temp') # Pasta onde serao guardados os ficheiros
2066  window.run()
2067  ############################################################
2068
2069  for i in range(Notebook.value):···
2076
2077  os.rmdir('Temp') # Apaga a pasta Temp
```

HOW ARC-TF WORKS

ALPHA ENERGY LOSS AND RUTHERFORD BACK-SCATTERING CHARACTERIZATION FOR THIN FILMS



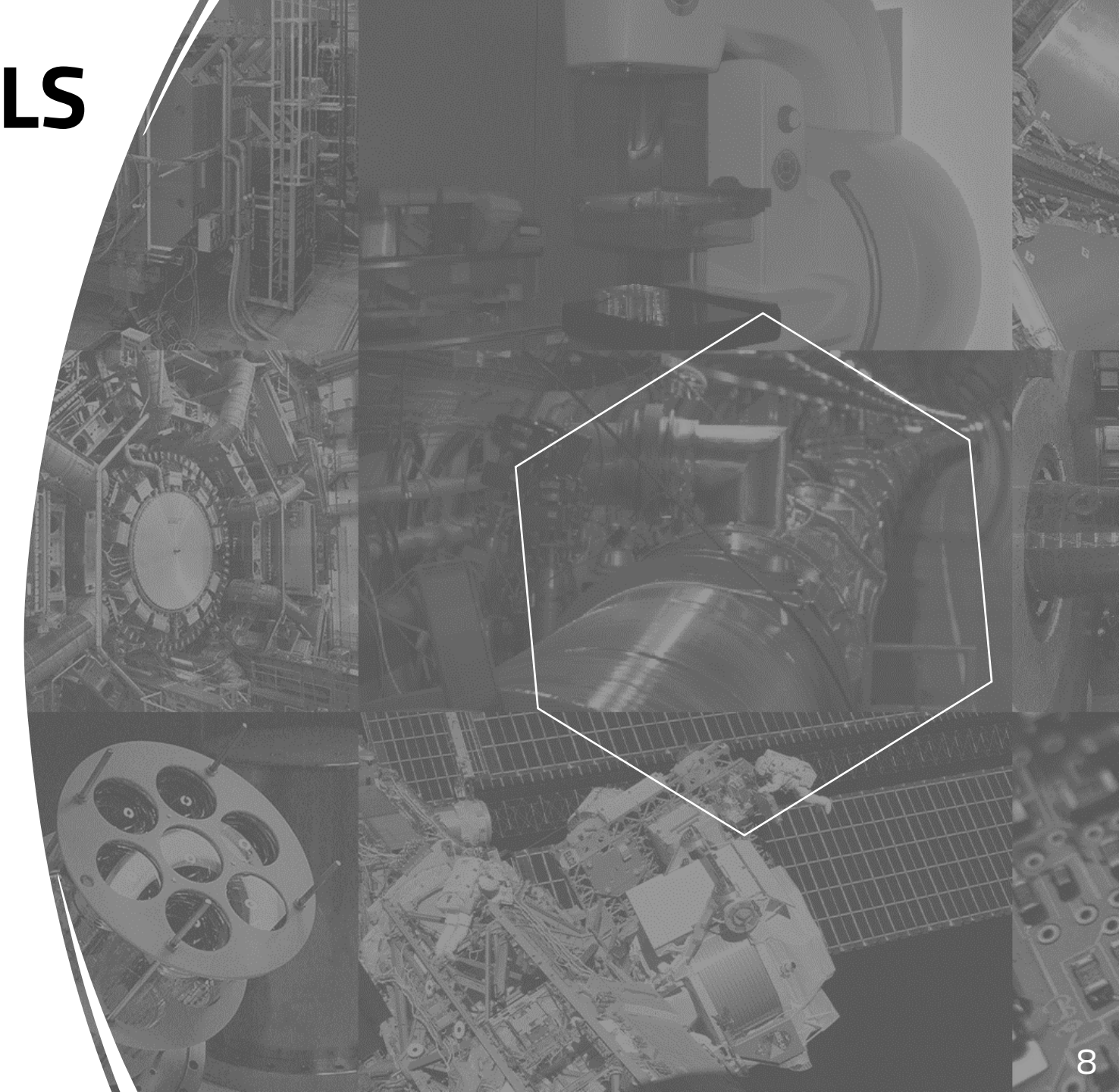
The Main Features and Libraries

- The Manual Selection Algorithm
- The Threshold Input Algorithm
- The Linear Regression and uncertainty Function
- The Thickness Calculation Function

- Tkinter
- Matplotlib and Math
- OS and Shutill

ACQUIRED SKILLS

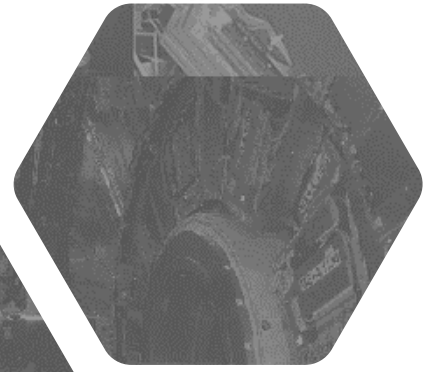
- Learned and Developed Python skills
- Git and GitHub basic skills
- Introduction to Object Oriented Programming
- Knowledge on Radioactive Sources
- Knowledge on Thin Film Technology and Production



Future Perspectives

ARC-TF

- Develop Versions for diferente OS
- Implement better Algorithms
- Incorporate AlfaMC
- Incorporate RBS Analysis
- Incorporate ML Algorithms, namely the ones developed by my colleagues



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Special Thanks to Ricardo Pires and Inês Valente

08.09.2023

ARC-TF at: https://github.com/AlexVnGit/GUI_thin_films