The Optimization of LIPS and MCNP Simulation to Improve Radioactivity Detection Limits in Thermal Waters

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EGY Plasma

Table of Contents

1- Background

- **Algeria's Geothermal Wealth**
- **Socio-Economic Value**

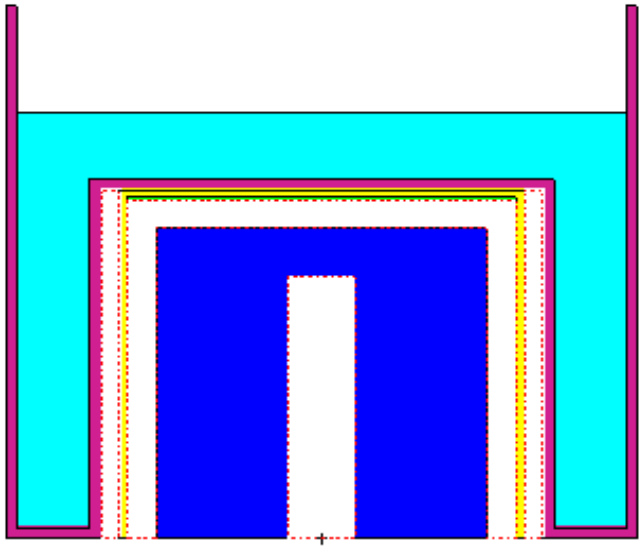
- **Radiological Concerns:** Naturally Occurring Radioactive Materials such as: ^{238}U , ^{232}Th , ^{222}Rn
- **Public Health:** (WHO: World Health Organization, IAEA: International Atomic Energy Agency).

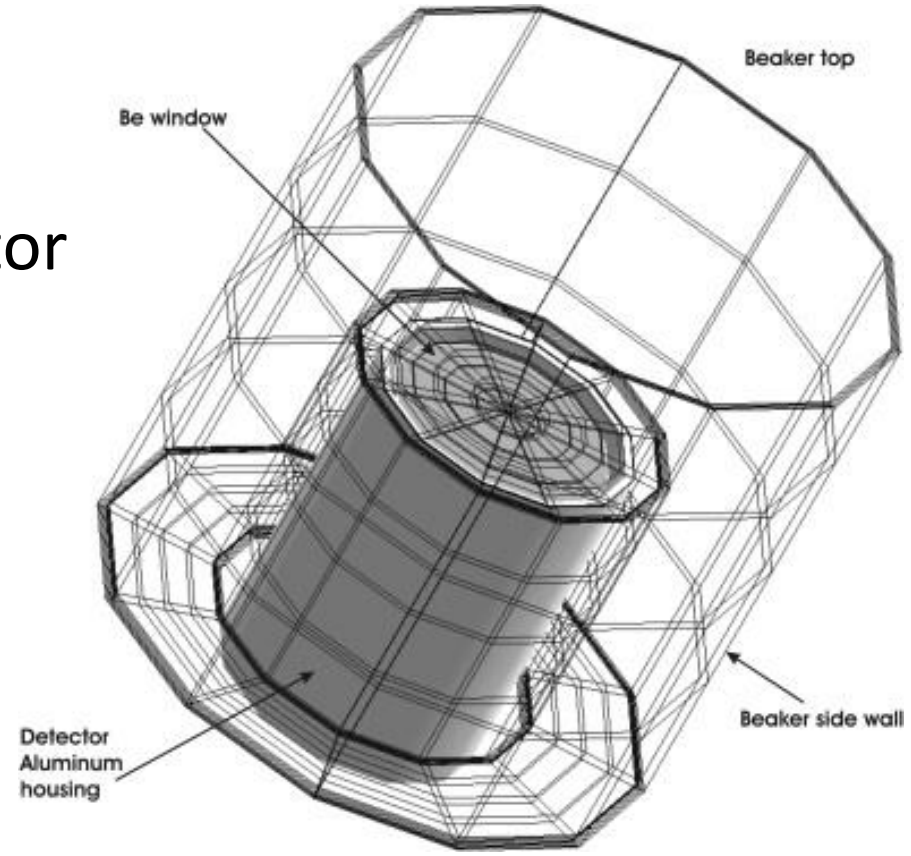
2- Motivation

- **Sensitivity With Traditional tools.**
- **Difficulty of how taking samples.**
- **Difficulty to make matrix elements.**

3- Methodology I: MCNP

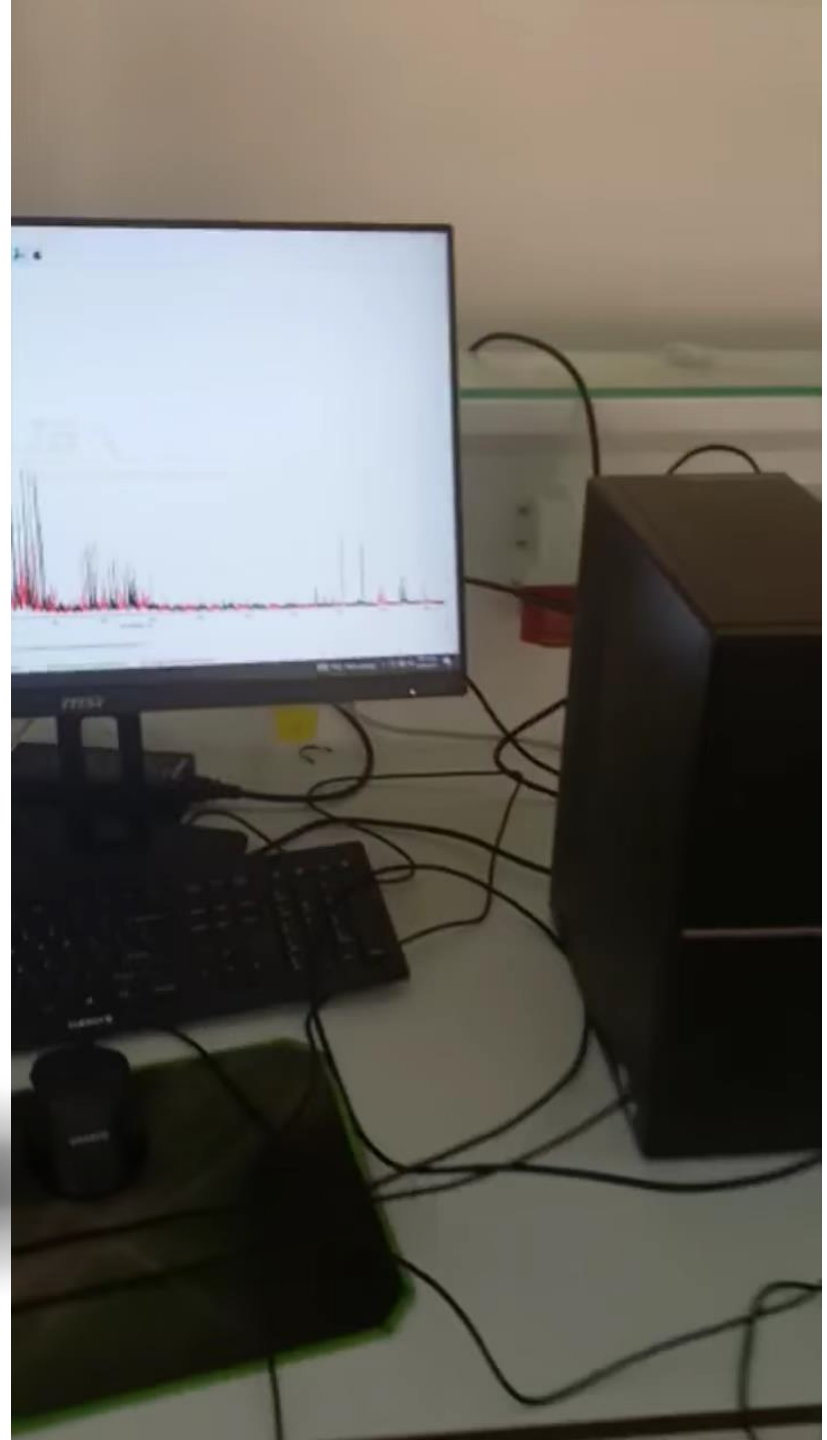
- **What is MCNP?**
- **Virtual Detector Calibration:** (HPGe) detector
- **Efficiency Mapping:** ^{238}U , ^{226}Ra , ^{40}K
- **Synergy:** a theoretical baseline to **LIPS** experimental.

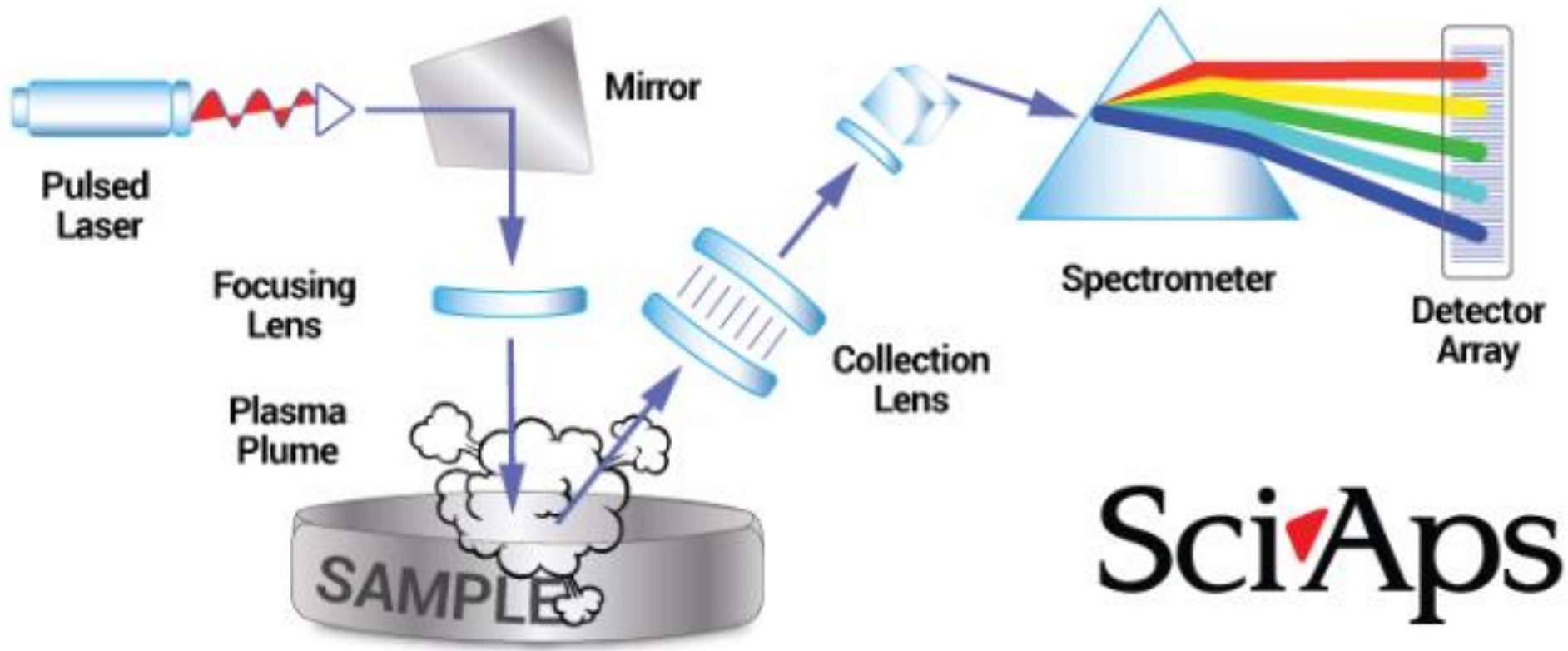




Methodology II: LIPS

- **What is LIPS Technique?**
- **Parameter Tuning.**
- **Liquid Sample Analysis.**
- **Data Integration.**

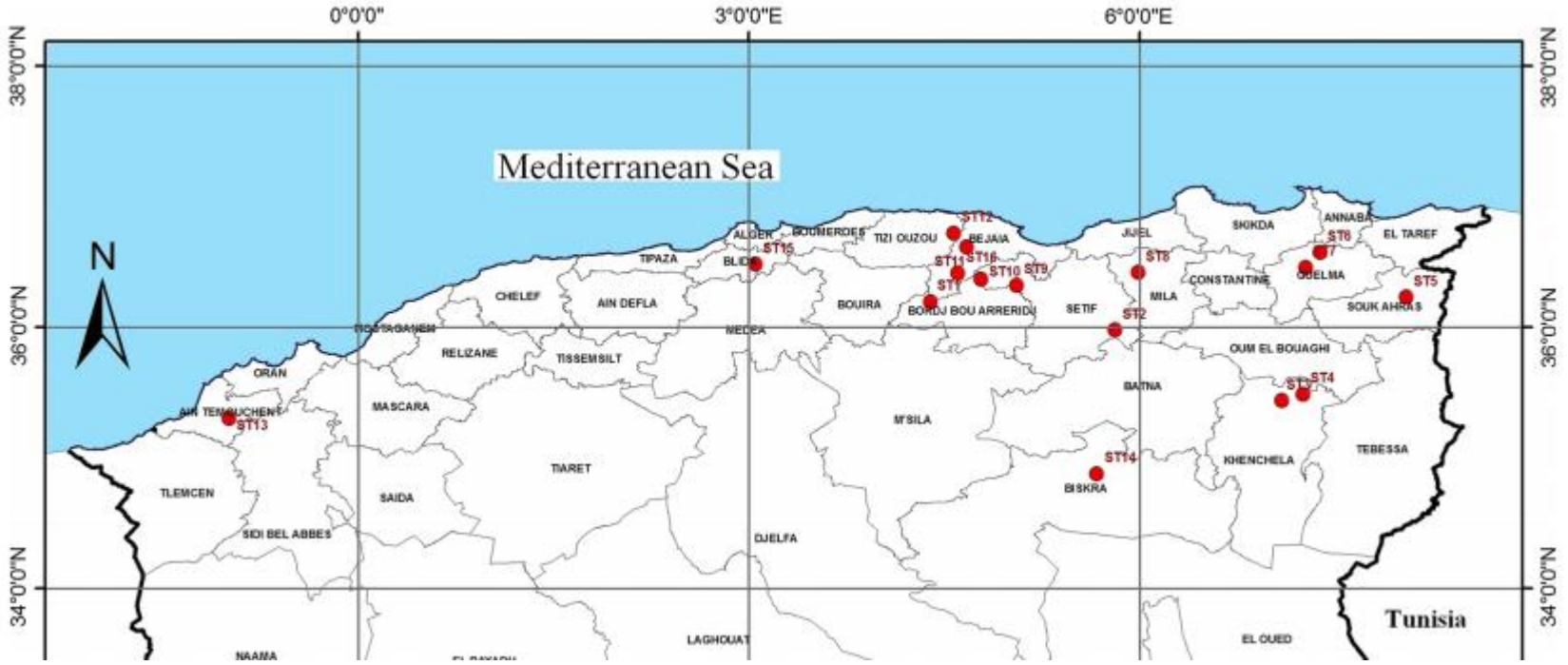



Pulsed
Laser
Mirror
Focusing
Lens
Plasma
Plume
SAMPLE
Collection
Lens
Spectrometer
Detector
Array

SciAps

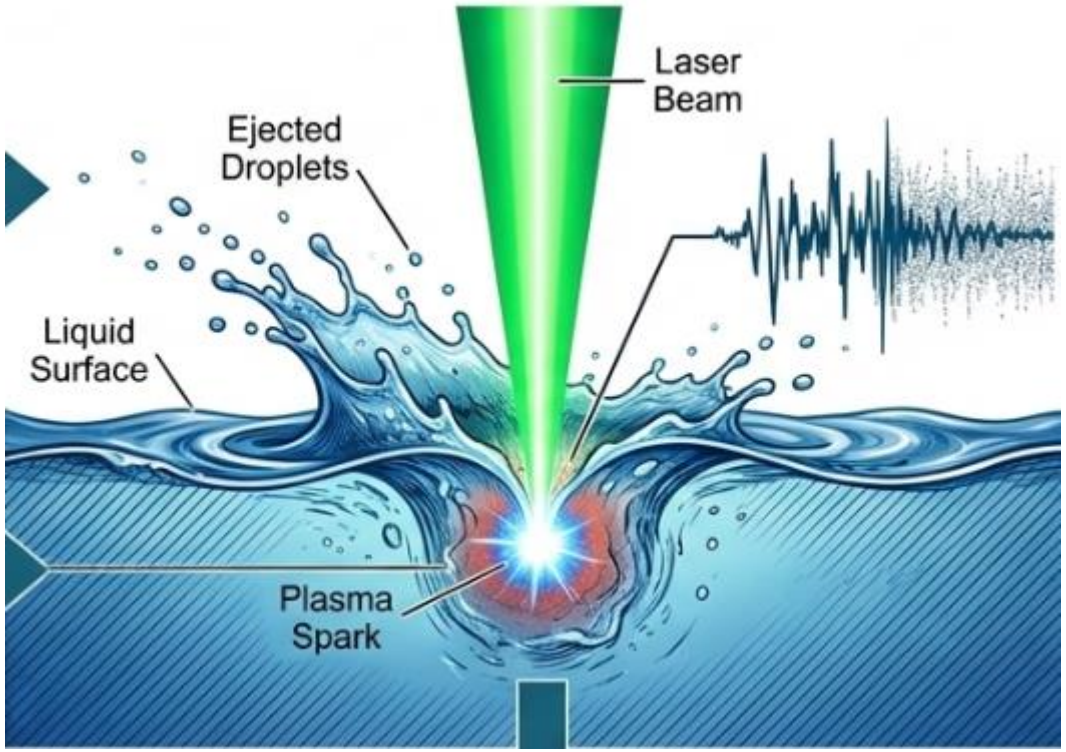
Current Status

- **Literature Review.**
- **MCNP Modeling:** input files and its errors.
- **Sample Collection:** 16 springs.
- **Experimental Readiness:** Preparing the **LIPS**.



Challenges

- **Sensitivity Constraints:** (LOD)
- **Matrix Effects:** ^{238}U not in Distilled Water.
- **Quenching:** The sample steals the plasma's heat.
- **Splashing:** the Next pulse
- **Geometric Precision:** The sample and the detector in MCNP



Conclusion & Acknowledgments

- **Summary.**
- **Open for Discussion..**

Thank You!