

SESAME

A Visit to SESAME

Allan, Salt, Jordan
August 30, 2018

A Brief Report Submitted to
Dr. Hanan Sa'adeh
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by
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Organization to be visited:

SESAME(Synchrotron-light for Experimental Science and Applications in the Middle East).

Location:

Allan, Salt, Jordan.

The Commander of Visit:

Dr. Hanan Sa'adeh (Department of Physics, The University of Jordan)

The Organization Host:

Dr. Giorgio Paolucci (SESAME's Scientific Director)

Participants:

Some of the master's and bachelor's students and graduates of UJ.

Purpose of visiting:

To get a closer look into the multidisciplinary and regional research center "SESAME", and to learn more about using synchrotron-light in several scientific applications.

Abstract:

This report presents a brief description of our visit to SESAME. The highlighted notes which I was interested in are showed and my feedback has been included.

Lines about the Visit:

The visit was of two parts, the first part was a very informative lecture by **Dr. Giorgio Paolucci**. He told us about SESAME construction stages, operational beamlines, devices and machines, obstacles, and future plans for SESAME. He explained deeply the techniques that they follow at SESAME and showed us some equations of electron beam creation and some examples of photon-matter interaction as a scientific tool.

The second part, **Dr. Paolucci**, and **Dr. Maher Attal** took us in a tour around the storage ring, control room, and the XRF/XAFS beamline.

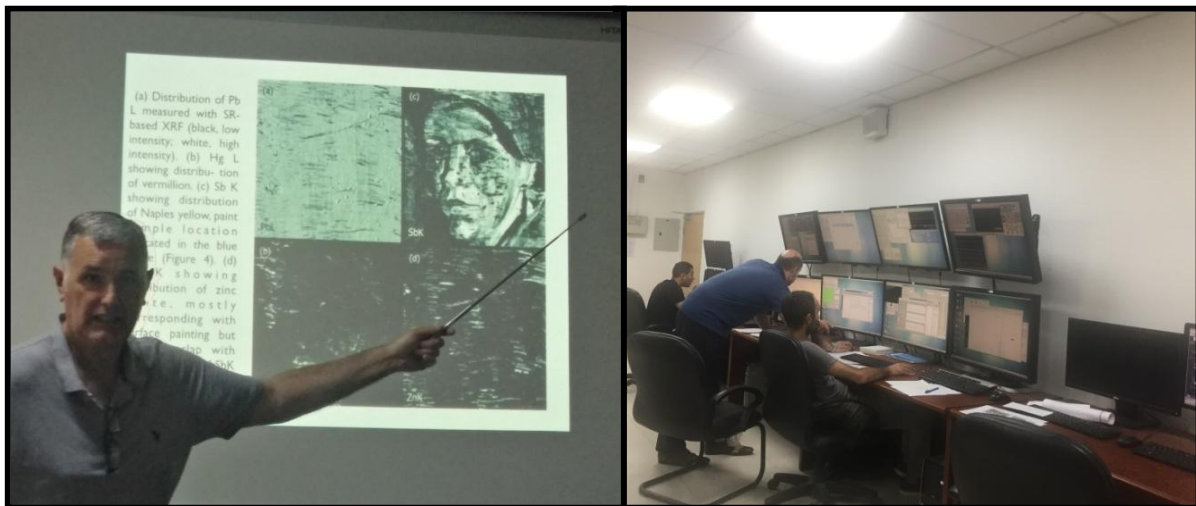


Figure 1: On the left, Dr. Giorgio Paolucci presented "SESAME: an opportunity for science in the Middle East". On the right, Dr. Maher Attal in the control room.

Here are the Most Highlighted Notes, in my Opinion:

- **There are two Active Beamlines in SESAME:**
 - 1- XAFS/XRF (X-ray Absorption Fine Structure/X-ray Fluorescence).
 - 2- IR.

- **The cost of one operational day is about 11K \$.**
- **What are the advantages of using synchrotron light compared to an IR lab source?**

- 1- The sync. photon radiation is only in one direction.
- 2- High photon flux.

- **Electron Beam Lifetime depends on:**

Mainly:

- 1- **Vacuum Scattering:** the lower the pressure, the longer the beam lifetime.
- 2- **Intrabeam Scattering "Touschek Effect":** for low-emittance storage rings, Touschek scattering is the dominant effect limiting the beam lifetime.

Secondary:

- 1- **Sextupole Magnet Settings:** it can improve the momentum acceptance, which increases the lifetime as well.
- 2- **Current on Each Bunch:** the lifetime can be improved by increasing the vertical emittance or decreasing the current of each bunch.
- 3- **The Cross-Section of a Beam:** the cross-section process is the probability that the two particles interact with each other. The cross-section depends on many factors. It depends on the target particle, the composition of the rest gas, also on the type of particle being accelerated. The cross-section process controls the conditions for beam losses energy and the corresponding lifetime.

My Feedback:

It was not my first visit to SESAME; however, this was the most useful and informative visit.

I wished that we had the chance to enter the storage ring and the booster (but understood that the machine was running). I hope one day to get a chance to carry out a real experiment starting from preparing the sample till ending by the data analysis.



Figure 2: A group photo of UJ's delegate in front of SESAME building.

Acknowledgment:

- 1- **Dr. Giorgio Paolucci** who was the man of the day.
- 2- **Dr. Maher Attal** for his valuable pieces of information.
- 3- **SESAME staff** for everything they gave us.
- 4- **Dr. Hanan Sa'adeh** for her efforts in organizing and managing such a visit.