

Automation and Interfacing of Research Laboratory Equipment

I.F. MORAIS¹

¹*Institute of Physics in Sao Carlos, University of São Paulo, 13566590, São Carlos, Brazil.*
Contact Phone: +5516992490784
Contact Email: iagoferreirademorais@usp.br

University of São Paulo - São Carlos Institute of Physics

Automation and Interfacing of Research Laboratory Equipment

Student: Iago Ferreira de Morais

Coordinator: Prof. Dr. Emanuel Alves de Lima Henn

Abstract

The present work aims to implement several automations on lab equipment in the context of an experiment to trap and cool Dysprosium atoms. Automation of such devices helps integration, easier computer control and remote management of the experiment. The work will focus on the following equipment:

1. Precision translator, capable of moving optical elements to transport atoms over long distances, or even within the optical trap.
2. Current sources, which generate magnetic fields.
3. Fiber lasers, to make frequency and power properties easier to manipulate, enabling control of atomic transitions.

In general, the methodology to be followed in all cases involves studying instruction manuals and becoming familiar with LabVIEW to develop integration and synchronization methods between instruments and the computer through the TCP/IP protocol, more specifically tailored to the context of Atomic and Molecular Physics experiments. And after achieving such feats, the software will be tested in applications to real physical problems that arise in the laboratory's routine.