## **Informatics/Physics Master Project**

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We are looking for an Informatics student with interests in Physics or a Physics student with serious informatics skills to help us update our laboratory control system. A more detailed project description can be found below. If you'r interested or if you have any further questions please contact us:

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## Laboratory control system for Quantum Information experiments

Modern experiments in research areas like quantum information, cold atom physics, high energy physics etc. require highly reliable, reproducible and time-critical experimental sequences. Generally those sequences are controlled with a software which addresses different devices, acquires data and offers real-time analysis tools. Usually one requires microsecond or even sub-microsecond precision in the execution of an experimental cycle which necessitates hardware triggering of most devices involved.

The student project is aimed at implementing a scalable laboratory control system which implements the features described above. The control system will be based on an already existing bus system developed by Prof. F. Schreck (refer to <u>http://www.strontiumbec.com/</u> for further information) which addresses 16-bit devices such as analog / digital output cards and direct digital synthesizers (DDS). A major modification of this system will be to change the current bus system, which is a parallel bus at 2 MHz, to a serial implementation. Furthermore the control system should be compatible to the preexisting control software written in Python.

A possible approach could be to create a list of control commands accompanied with a timestamp which are sent via Ethernet connection to different synchronized microcontrollers (e.g. BeagleBone etc.). Those will translate the commands into data words readable by the parallel ports of the hardware involved at the clock speed of the CPU.

After successful implementation the student will also be involved in changing the current experimental control to the new system and actually performing measurements in cold atom and quantum information experiments.