Photon Counting with an Embedded Micro Mojo V3 FPGA

SARA LENTRICCHIA, CARL GROSSMAN, Swarthmore College — We used an inexpensive Field Programmable Gate Array (FPGA) to generate time stamps from a photon counting experiment. The FPGA was configured to receive signals from an avalanche photodiode, latch onto a 32 bit, 400 MHz clock/counter, and transmit the time stamps to a host computer. These time stamps were then analyzed on the host machine in real time to calculate the intensity auto-correlation function of the signal source, in our case a fluorescence correlation spectroscopy experiment. The basic state machines for the system are a clock/counter/trigger, FIFO data buffer, and serial I/O to an onboard processor that handles communication with the host. The trigger state machine is similar to a clock except the cycle is based on the signal positive edge. The trigger cycle stores the counter and initiates data transfer to the FIFO buffer.

Supported by HHMI and Swarthmore College