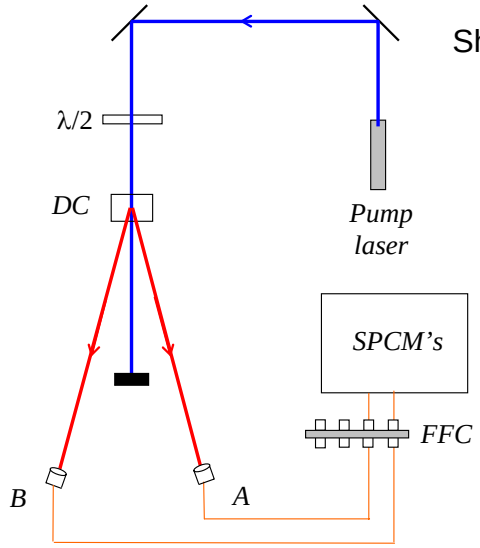
Coincidence Measurements



Show:

1) Angular Correlations

2) Temporal Correlations

Lasers

Type	Power (mW)	Wave-length (nm)	Price	Comments
Diode-Pumped, Frequency Doubled	20	409	$5k	(40mW, $6k)
Laser Diode	50	405	$7.6k	Circularized Beam
Laser Diode	185	407	$9.1k	Multi-Spatial Mode

Prices will come down in next few years

New DVD technology (HD-DVD, Blu-Ray) uses 405 nm lasers

Lasers

These are full systems

- Power supply, TEC's, Collimation Optics...

Can get individual Laser Diodes

- 405nm, 35mW, $2.6k (Thorlabs)

50mW System

- Works great!

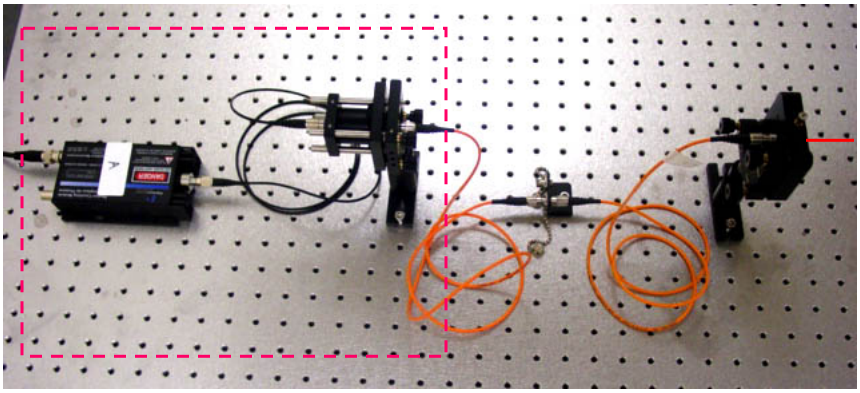
185mW System

- Way more counts!
- Works great for non-entangled states
- Jury out on polarization entangled states
  - Entanglement not as good as 50mW source

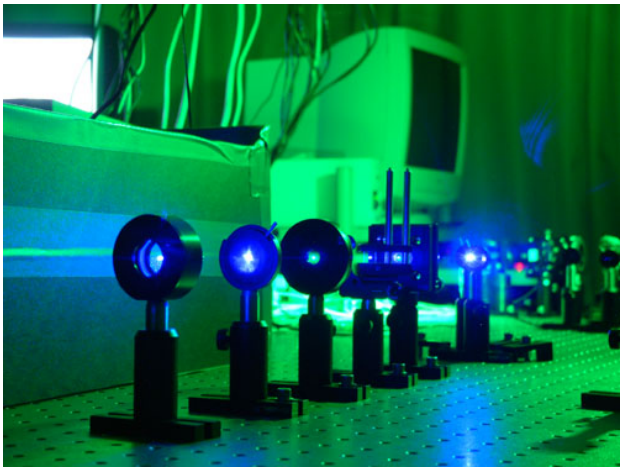
Protecting the Crystal

Desiccant at night

Collection Optics



Photon Count with the Lights on



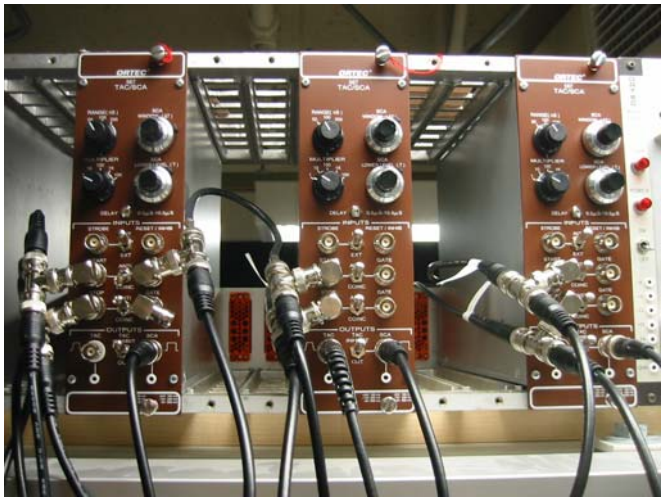
Filters block green -- pass NIR

Single Photon Counting Module

~$9.5k with box

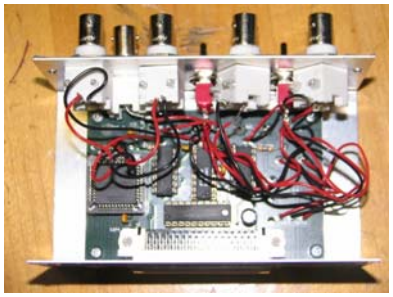
About 1/2 the cost of
4 individual counters

Coincidence Electronics



~$10k for 4 modules and crate

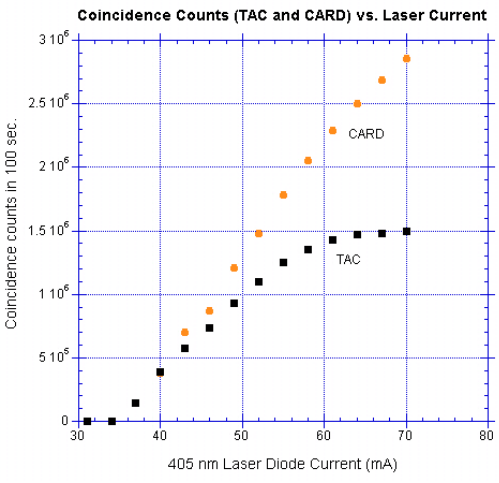
New Coincidence Electronics



In collaboration with Dave Branning and Dave Ahlgren at Trinity College

~$100

New Coincidence Electronics



Advantages

- Cheaper
- No dead time
  - Higher count rates

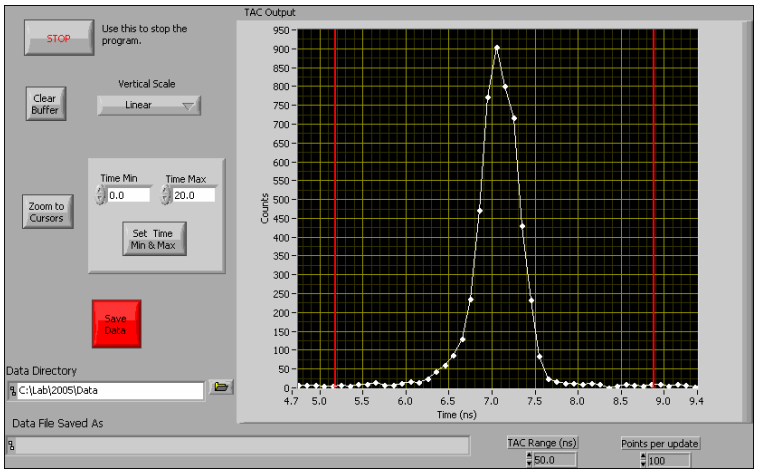
Disadvantages

- Lower time resolution
  - Higher accidental rates

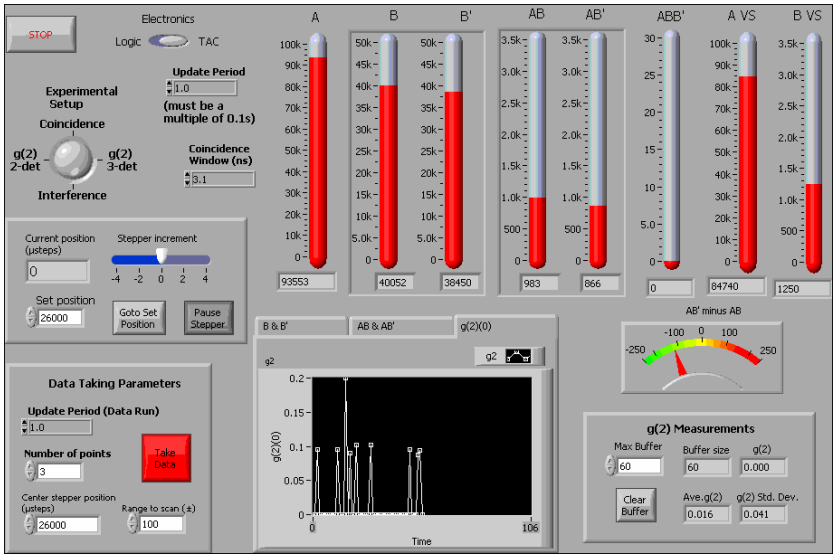
Observing Temporal Correlations

Cheap MCA

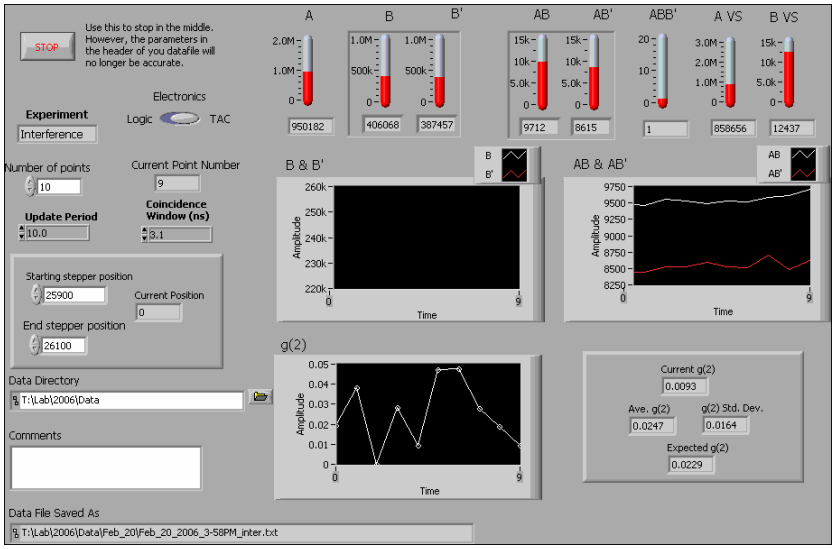
- Use trigger circuit, A/D converter, and LabView



Tweaking

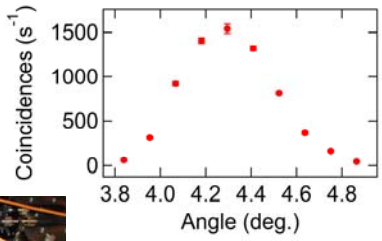


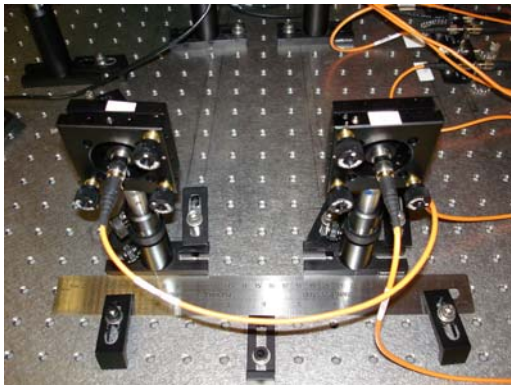
Taking Data



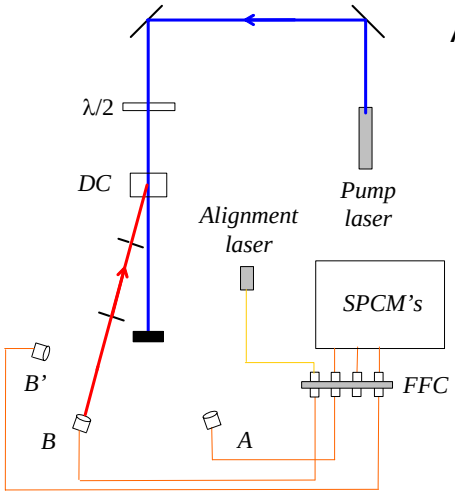
Observing Angular Correlations

Slide detector along ruler



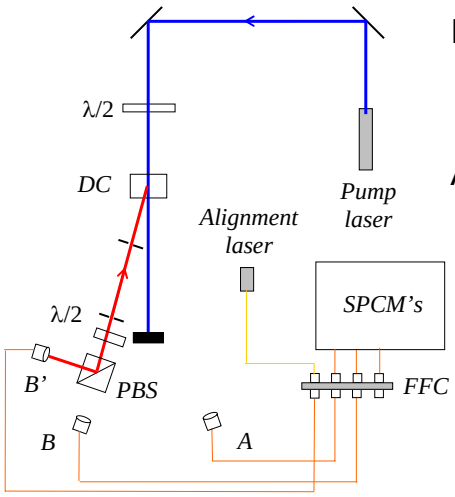


Aligning Other Detectors



Align laser backwards through pinholes

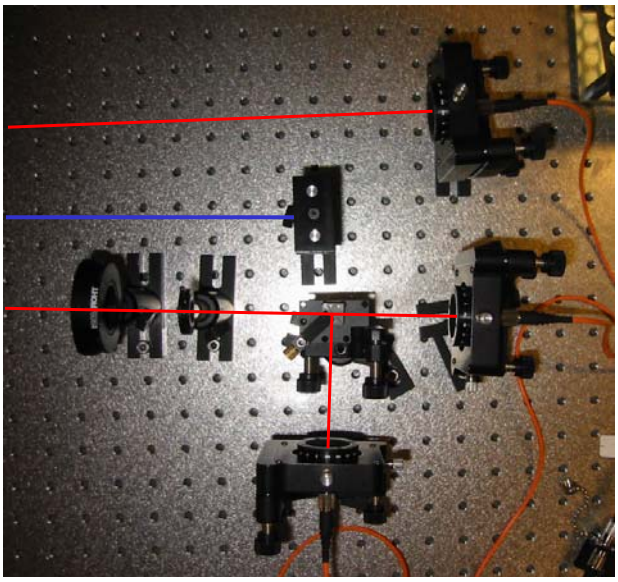
Aligning Other Detectors



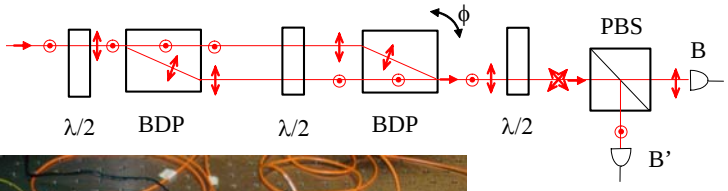
Insert PBS and B' detector

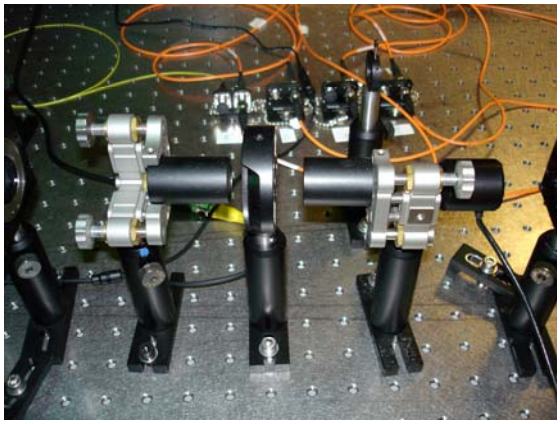
Align laser backwards through pinholes

Aligning Other Detectors

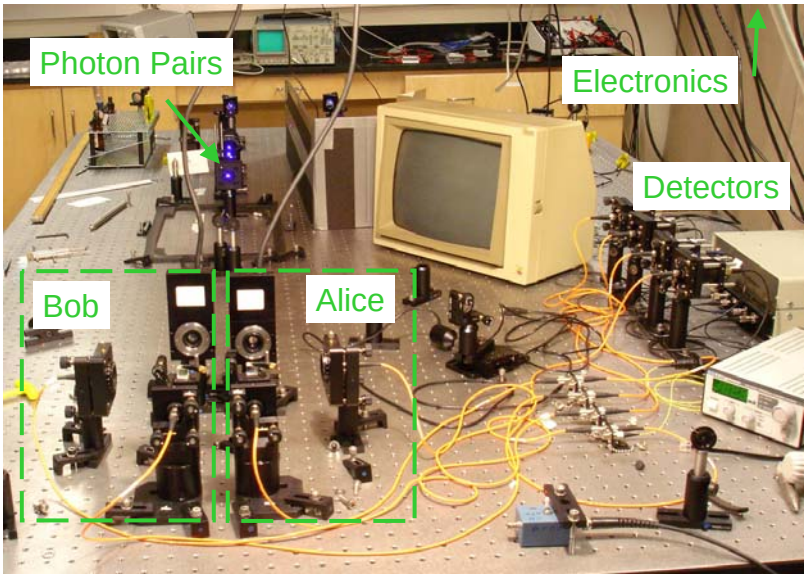


Polarization Interferometer

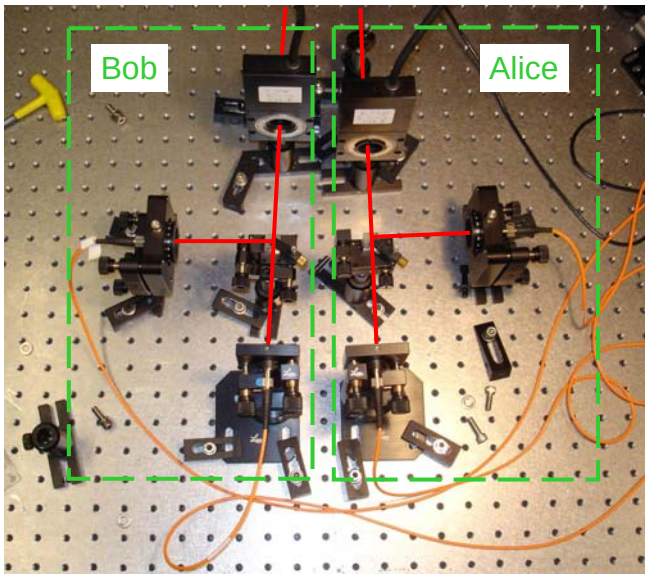




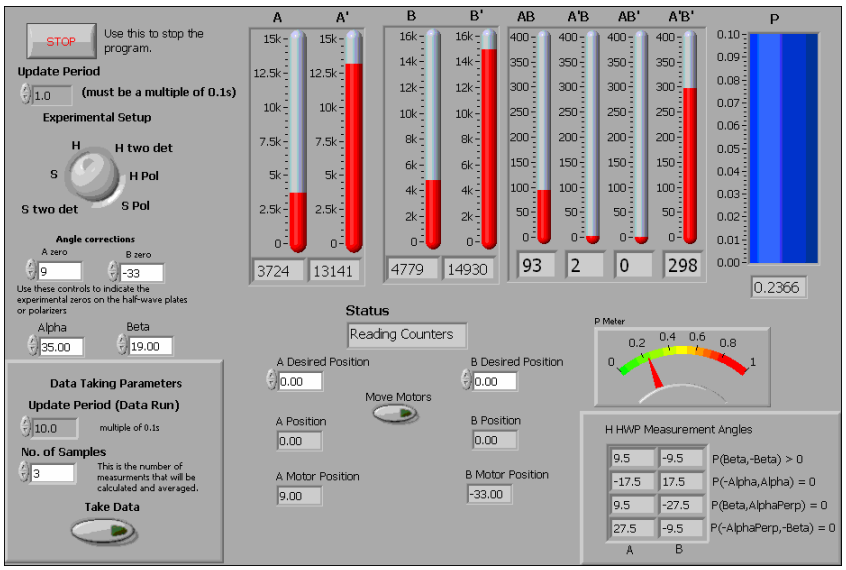
Local-Realism Experiments



Local-Realism Experiments



Tweaking



Taking Data