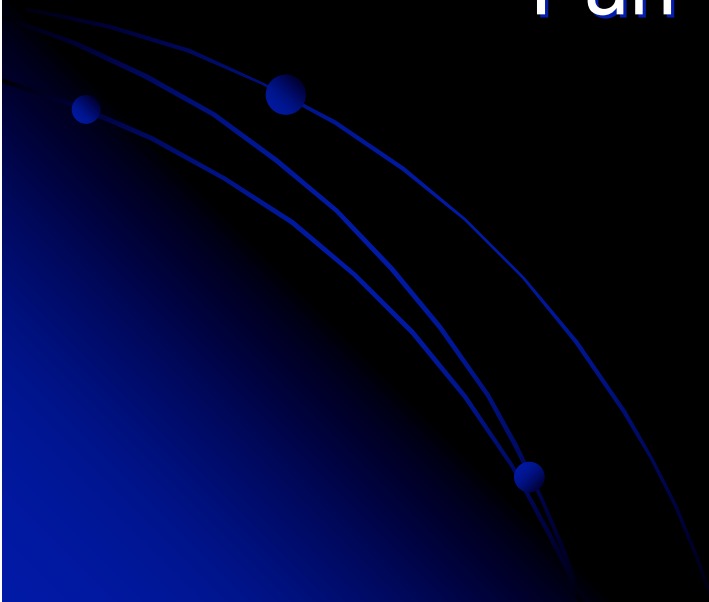


# Adventures in Potma Labs

## Episode 1

### Fun with Ultrafast Lasers



# Ultrafast lasers

- Verdi 18W
- Mira Ti:Sa
- RegA 9000 & compressor/expander

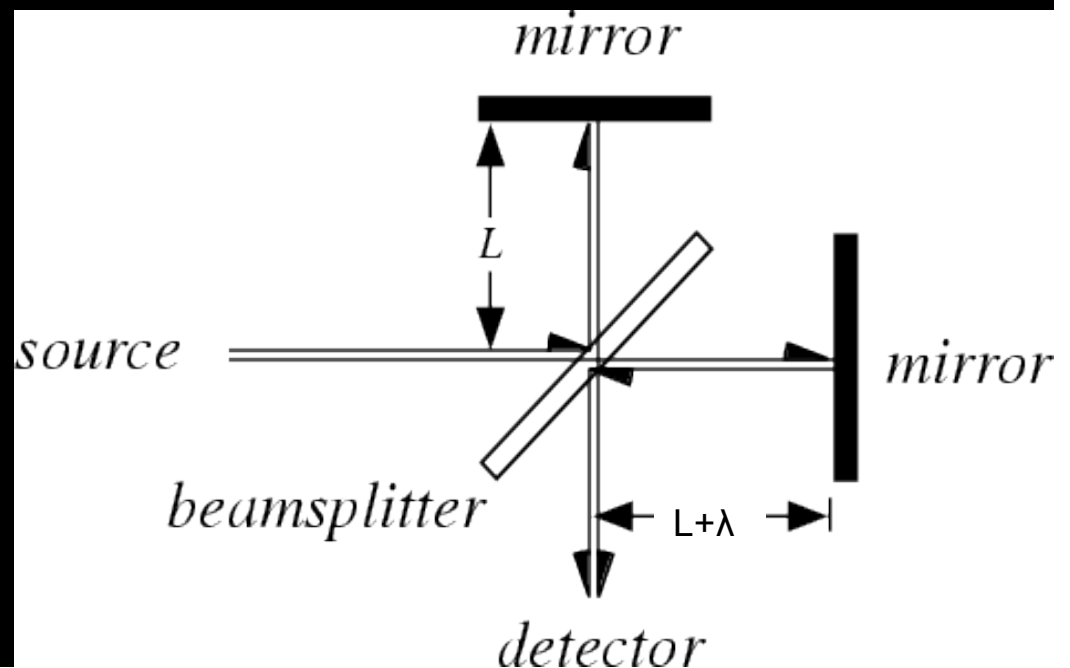


# Interferometry

- Utilizes wave properties of light (amplitude, phase)
- See interference patterns in the beam

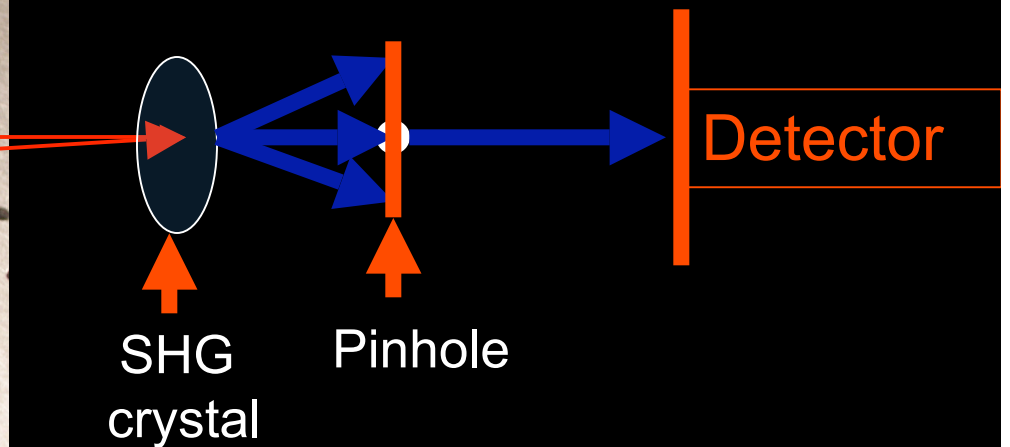
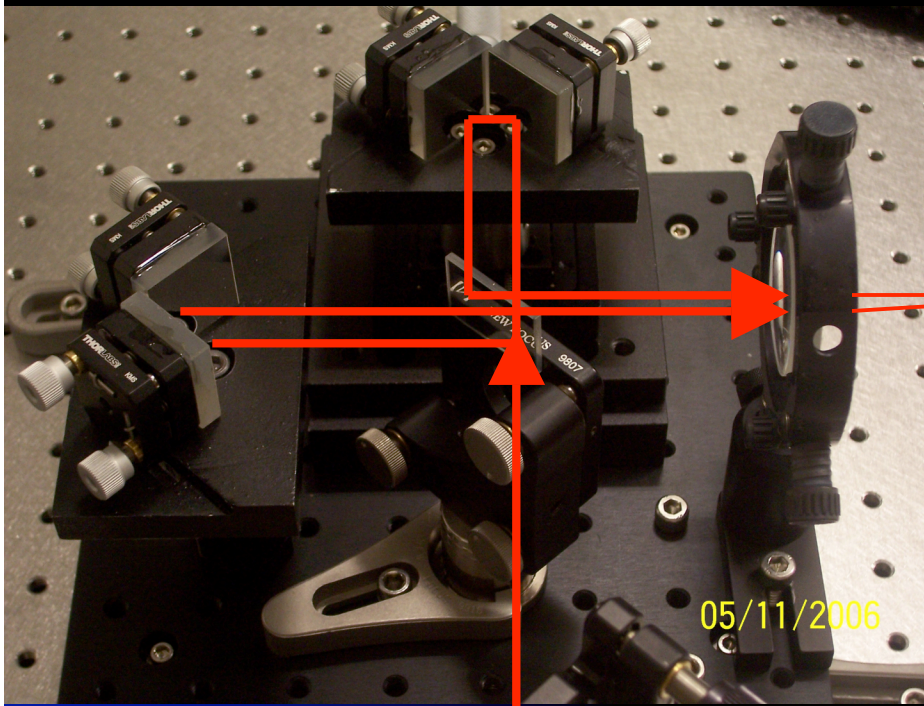


03/14/2006



# Interferometric Autocorrelation

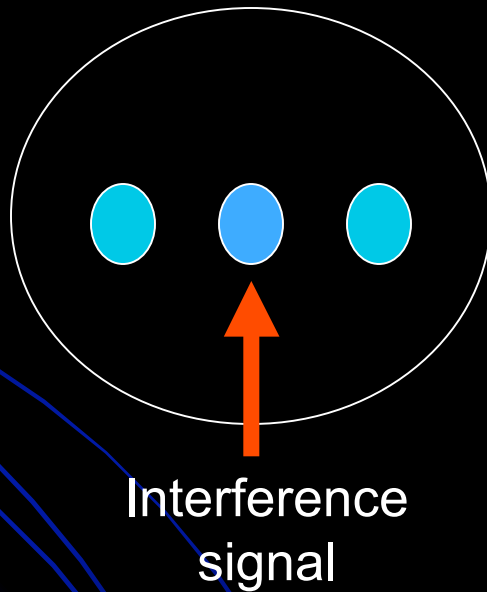
- The cross-correlation of a signal with itself
- Used to estimate the duration of ultrashort pulses in mode-locked lasers



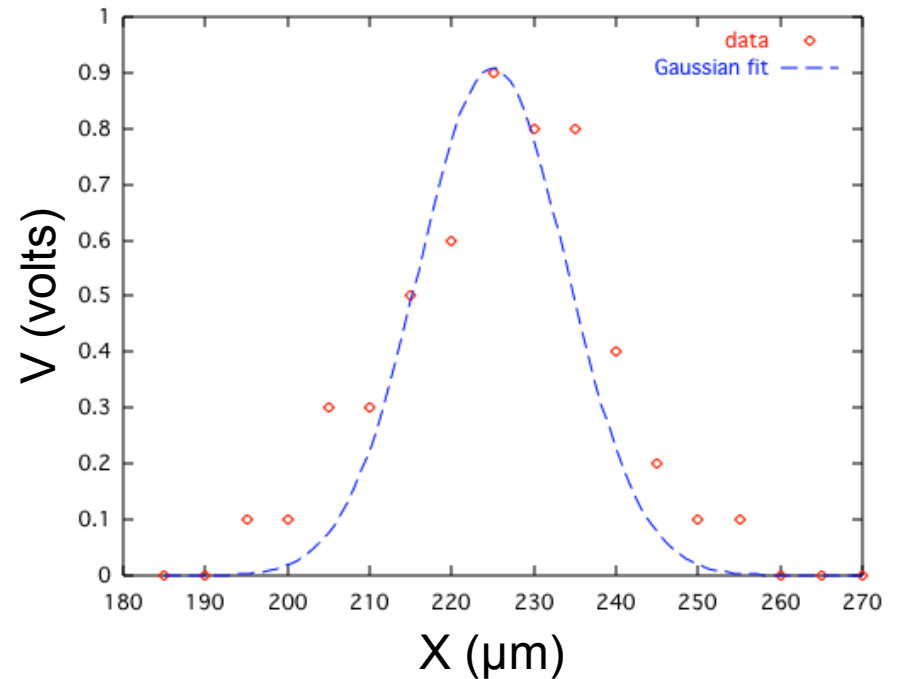
# Measurements

- Actual duration: 50fs
- Calculated: 46.67 fs

$$V = \frac{20.5}{9 \times \sqrt{2\pi}} \exp\left(\frac{-(x - 225)^2}{2 \times 9^2}\right)$$



Autocorrelation of REGA 9000

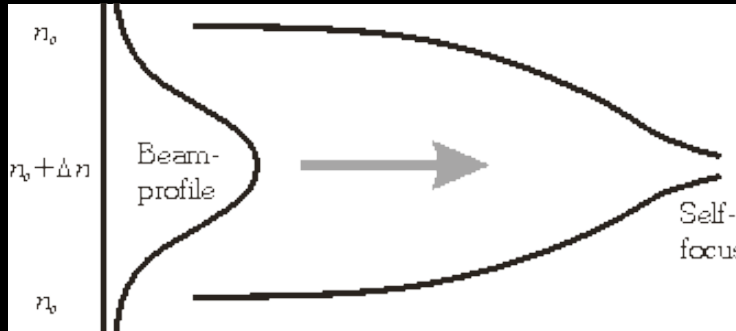


# NOPA

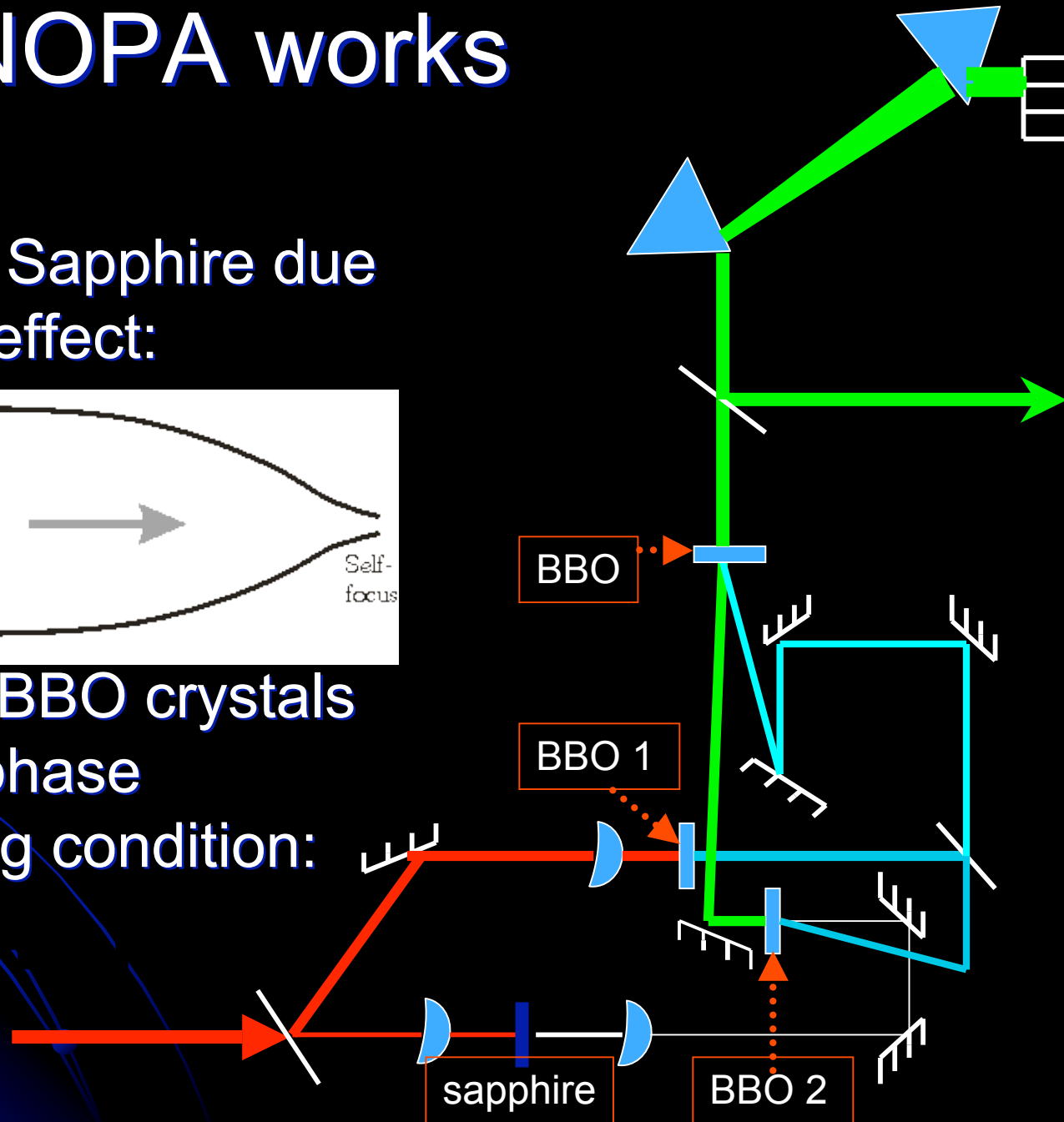
- Noncollinear Optical Parametric Amplifier
- Allows tuning of your pulse wavelength by a broader range (~450-1100 nm)
- 2 arms
  - 1 for WLG using Sapphire plate (~10% power)
  - 1 for 2-stage OPA using BBO (Beta-Barium Borate) crystals

# How NOPA works

- WLG in Sapphire due to Kerr-effect:

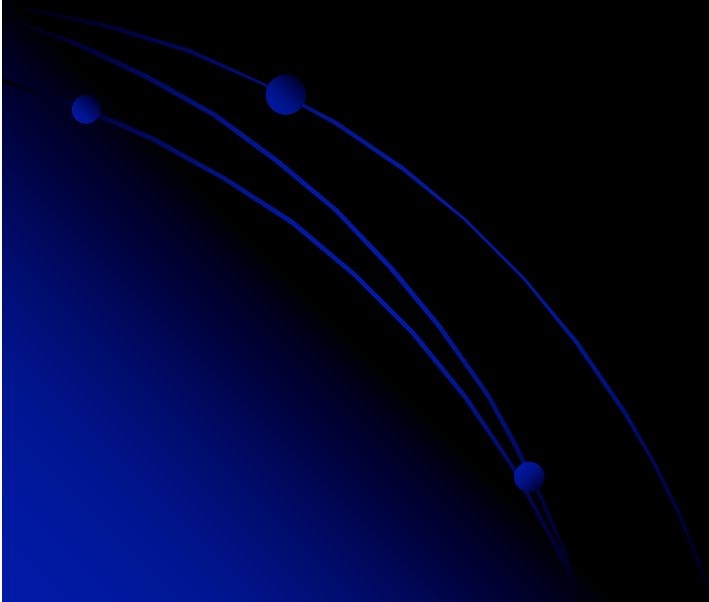


- OPA in BBO crystals due to phase matching condition:



# What's next?

- Finish NOPA
- Finish 1<sup>st</sup> year of graduate school
- Single molecule imaging



# Ann for leading the way for women in Potma Labs,

