

# The COSMOS “Variable stars” project

Using elements of inquiry to enhance a guided activity

# What we did in 2001

Investigating eclipsing binary stars

- Observations with Nickel telescope
- Data reduction in IRAF
- Analysis using computer simulations
- Presentations

*Very* guided...

...wanted to move towards more open-ended activities

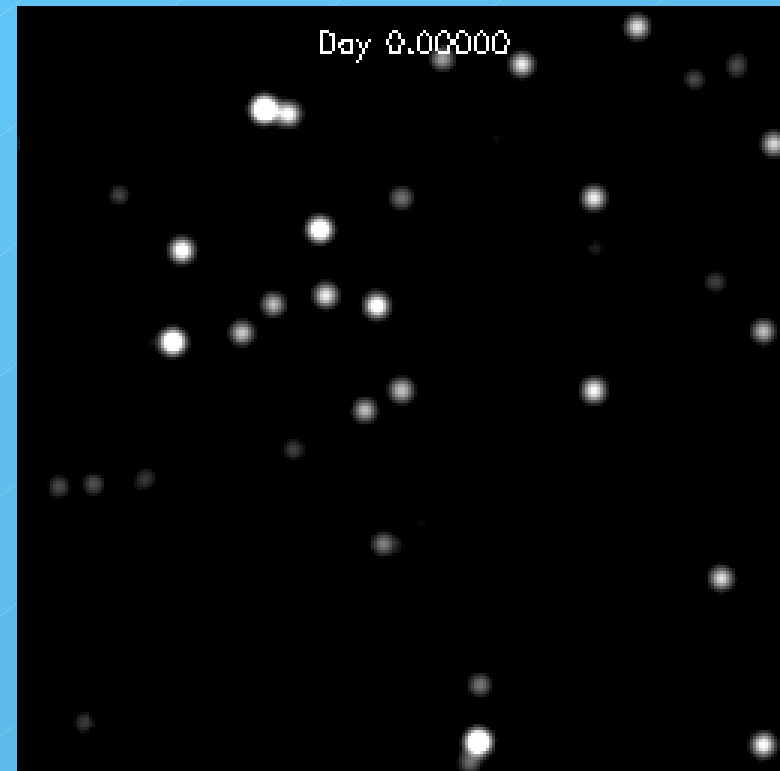
# Changes for 2002

- Introduced “mystery” concept
- Starter: simulated movie of variable stars
- Tabletop eclipse experiment
- Observations and data reduction
- Computer simulations
- Presentations

# Starter

- Simulated movie
- “Find the stars!”
- Why do the stars vary?  
A planet blocks the light?

2x1h



# Tabletop eclipse experiment



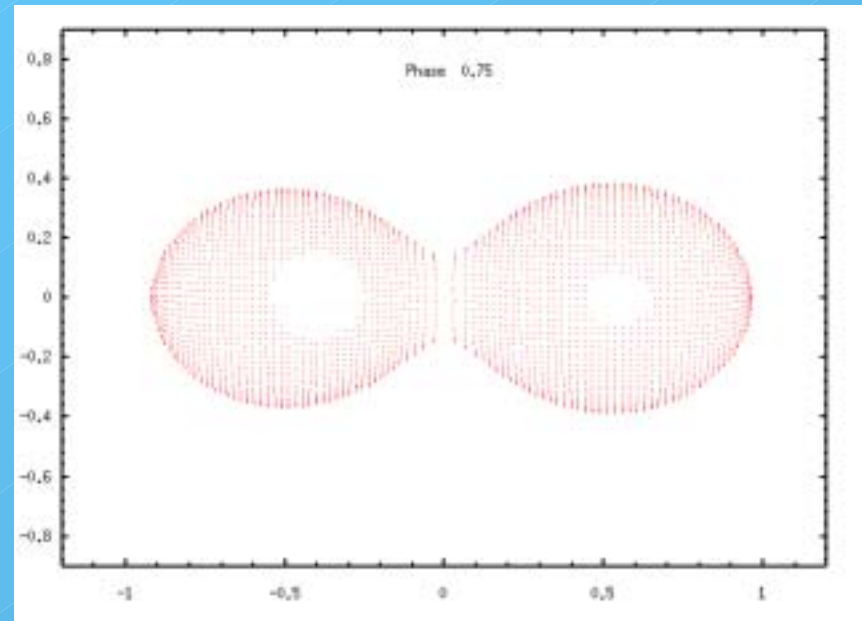
- Most open-ended part, but still with a well-defined goal:  
They figured it out: 2 stars, not a star and a planet!

2x1h

# Computer simulations

- Match model and observations
- Computer equivalent of eclipse lab
- Get an image of the system

The two stars actually touch!



# Design (Maui 2002)

- Identified 2 major conceptual realizations:
  - The star varies because something blocks the light
  - It's actually 2 stars
- Wanted to design open-ended activities targeted at these concepts. Why?
  - give a sense of discovery
  - Make the students feel like they are driving the project
  - Show them the inductive side of science
- This necessarily implied the “mystery”

- Design challenges
  - the open-ended activities still have very specific content goals that must be met
  - Anticipating student response essential
    - Having taught project in 2001 valuable experience
  - Worked fairly well. Luck?
- These changes came out of last year's design session!

# Quotes from presentations

- “Our project was a little different from everybody else’s, it was more of a mystery. We didn’t really know what a variable star was, we had to find out what it was through experiments, labs and observations.”
- “We thought of using two stars instead of a star and a planet, so we put them close to each other and guess what? It turned out that our star OO Aql was actually a binary star, two stars revolving around each other”
- “What I got from this project and what you should get from this presentation, I wanted you to go through this experience of solving this mystery about the variable star.”

Jesus Cruz

# Summary

- 2 main changes since 2001:
  - Including a more open-ended experiment part
  - “Mystery” concept, only revealing the parts of the project step by step.
- Both motivation for and knowledge how to implement these changes direct result of previous workshops
- Including elements of inquiry added enthusiasm and sense of ownership and discovery