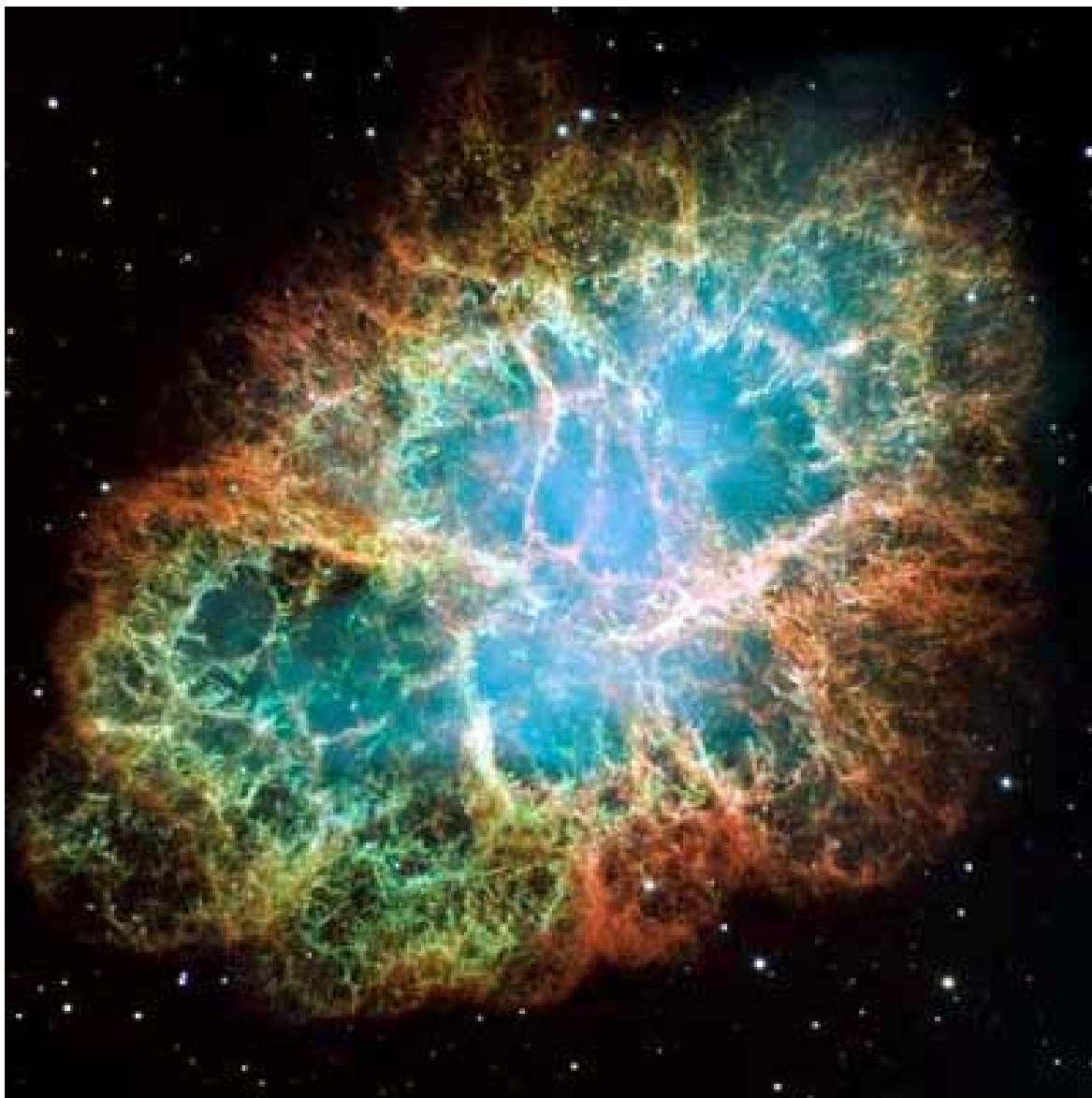


# Applications of Astronomy: An Overview

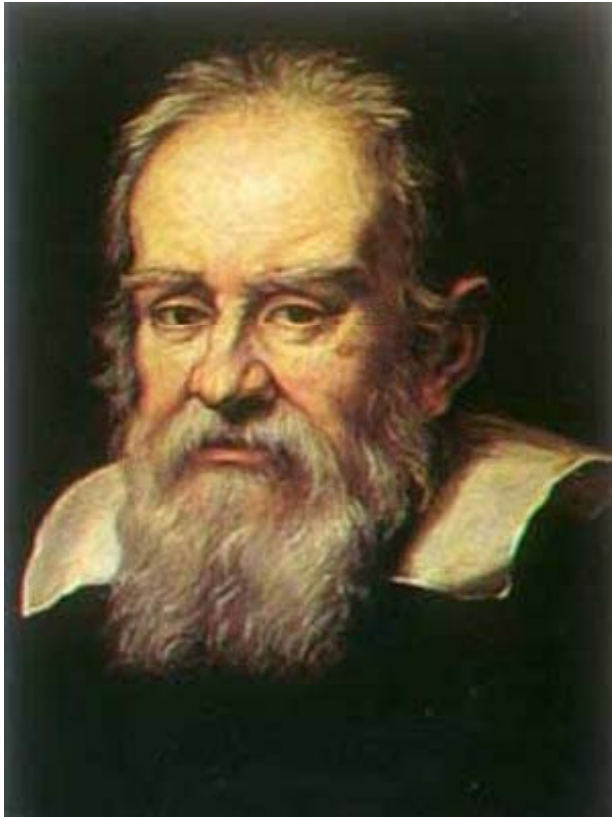
Gordon Love

Centre for Advanced Instrumentation  
Durham University Physics Department



# Do you think astronomy is a useful science?

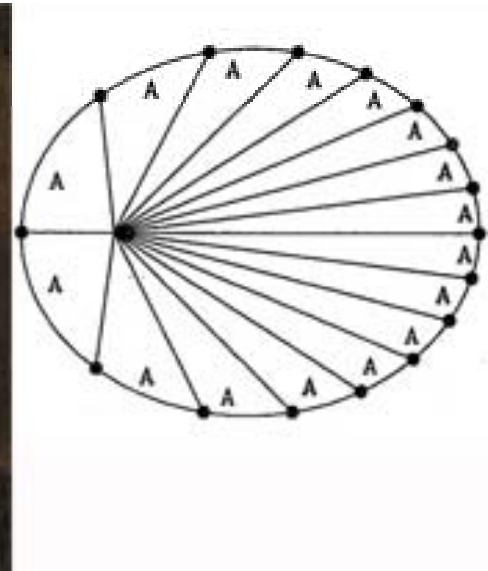
“Personnally (sic) I think astronomy, at the present time, is a waste of time for several reasons. The current resources allocated for astronomy range in the billions of dollars. Also the current minds working on astronomy could be doing something far more useful for society. For example we could put these resources in aiding the third world countries. And I don't see why we don't. I think astronomer's should pay more attention to what's around them than what's above. Of course there are mopre (sic) reasons, but i'm to lazy to write them down at the moment....Ultimately astronomy is a waste”.

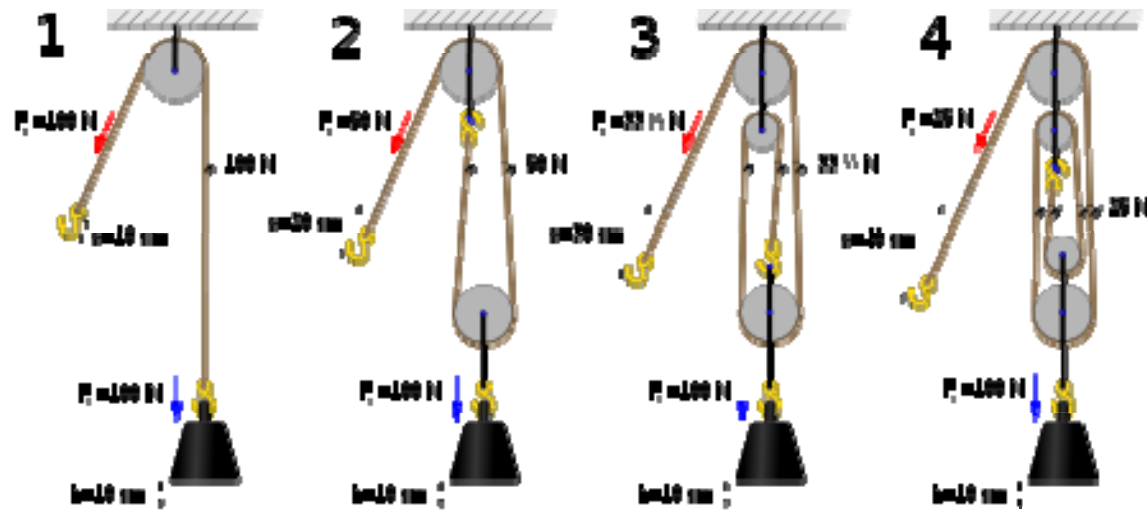


# Applications of Astronomy

1. Applications of Astronomical Science
2. Applications of Astronomical Technology
3. Cultural Applications of Astronomy

# Applications of Astronomical Science











# GPS and Relativity

1. Clocks on orbiting spacecraft run more slowly than ground based clocks because of special relativity
2. Clocks on spacecraft run more quickly than ground based clocks because of general relativity.
3. Both these effects must be accounted for, as well as the effect that orbital speed is not constant because orbit is elliptical

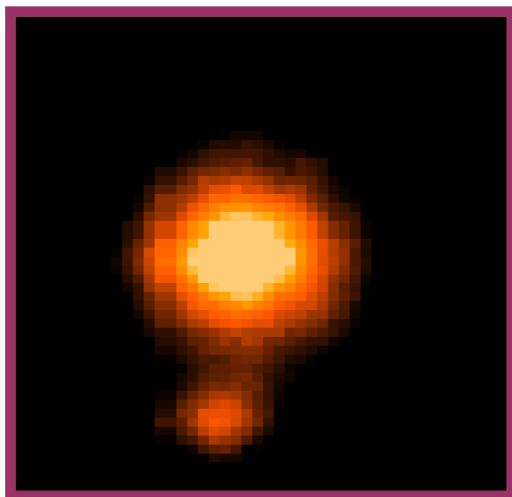
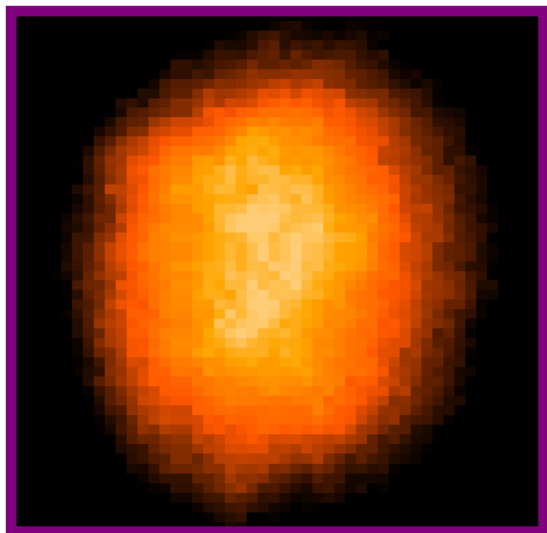


# Applications of Astronomy

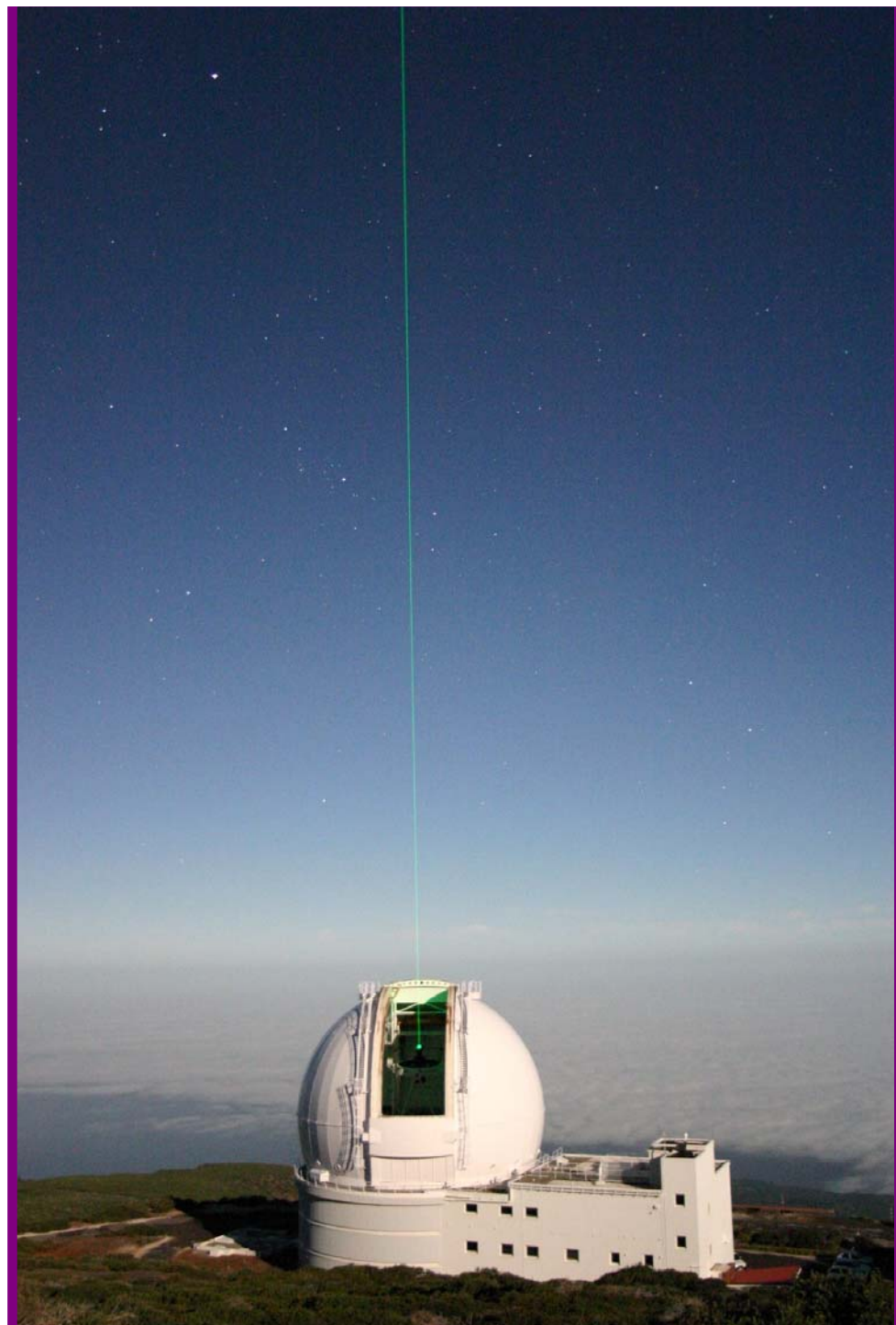
1. Applications of Astronomical Science
  - Very long time scale
2. Applications of Astronomical Technology
  - Much shorter timescale
3. Cultural Applications of Astronomy

# Applications of Astronomical Technology

- Biomedical Imaging
- Environmental Monitoring
- Security and Defence
- Communications
- Energy



0.36 arcsec binary,  
with & without AO



# Applications of Adaptive Optics: The original ideas

- Microscopy
- Retinal Imaging
- Binoculars
- Optical Data Storage
- Free space laser comms.
- Optical Interconnects
- Laser machining
- Lasers for fusion
- .....

# Applications of Adaptive Optics: What has happened?

- 

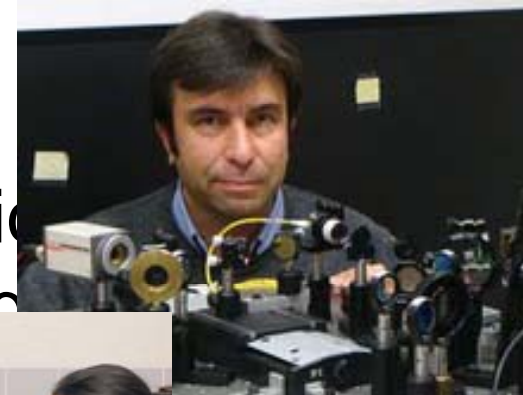


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Sensing

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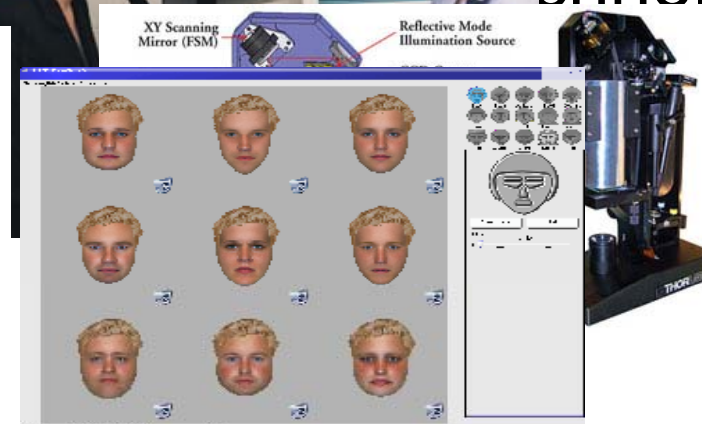
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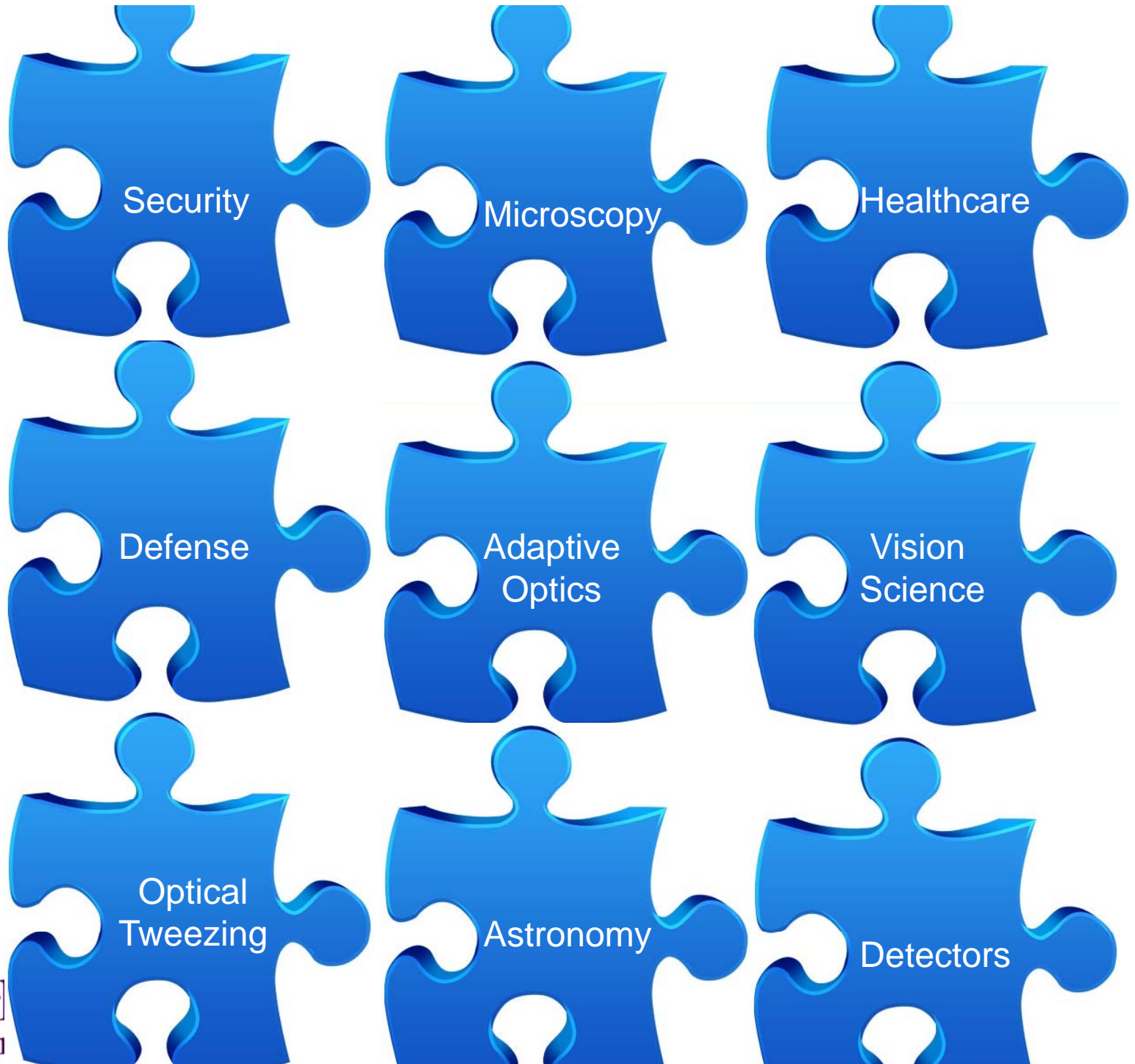
Lic  
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Justifying space exploration  
because we get non-stick frying  
pans is like justifying music  
because it is good exercise for the  
violinists right arm.

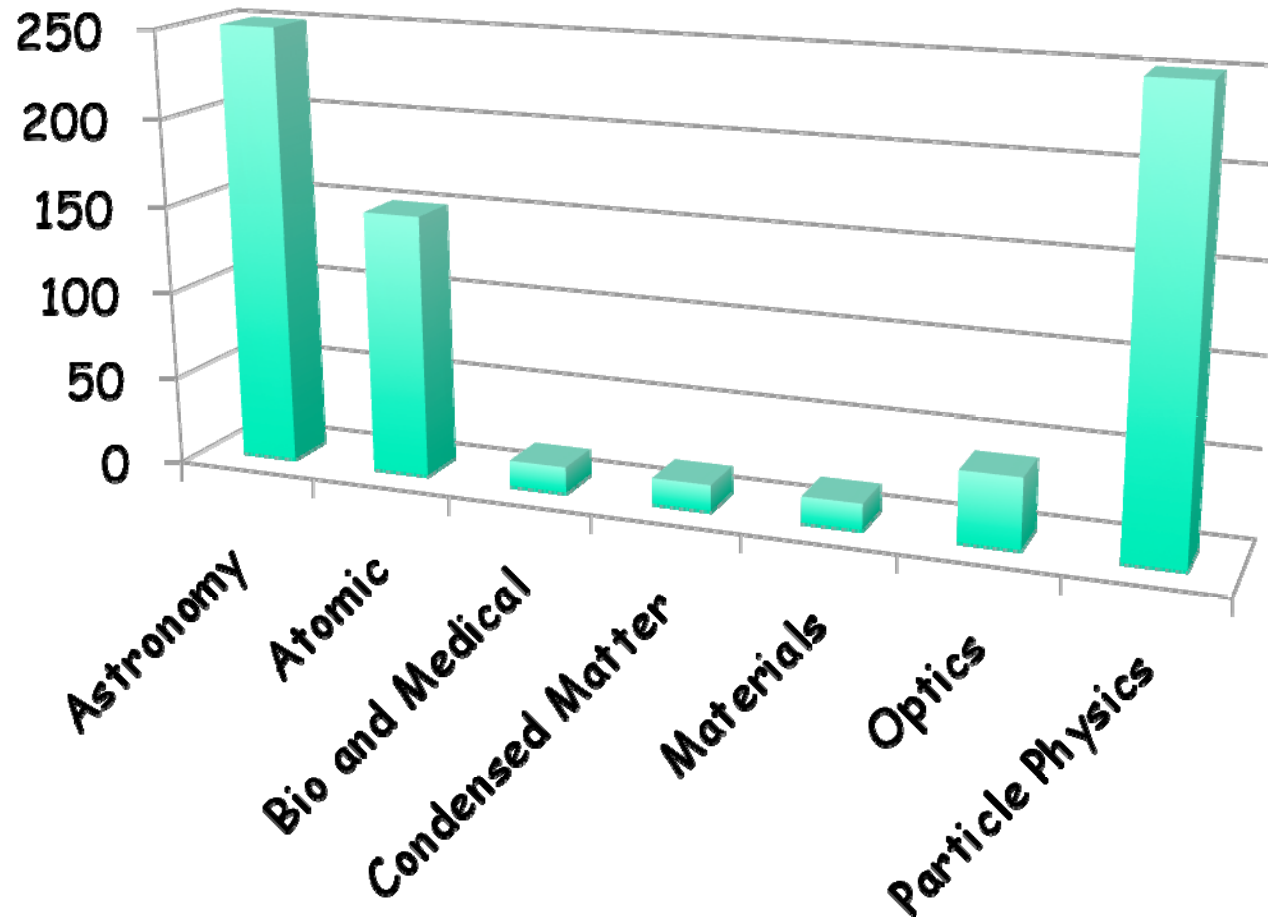
-Richard Dawkins

# Applications of Astronomy

1. Applications of Astronomical Science
  - Very long time scale
2. Applications of Astronomical Technology
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3. Cultural Applications of Astronomy

Does Astronomy inspire Students to study Physics (who then go on to become engineers, financial gurus, and teachers etc) ?

# What made you choose to study physics?



# Once a Physicist

- Amira Sa'id
  - Belly Dancer
- Ian Leigh Managing
  - Director of Postwatch
- Eddie Morland
  - Chief Exec of HSE
- Walter Williams
  - 10 pin bowling champion
- Tony Hey
  - VP of external research at microsoft
- Scott Saunders
  - Essayist and Prof. of English



# Conclusions

- Astronomy is a cornerstone of science – both historically and today
- Astronomy has had an enormous number of applications.
- However- let's not think of science as a 1-way flow of data from theory to application. Modern astronomy is just one part of the jigsaw of modern science which both affects and is affected by developments in technology