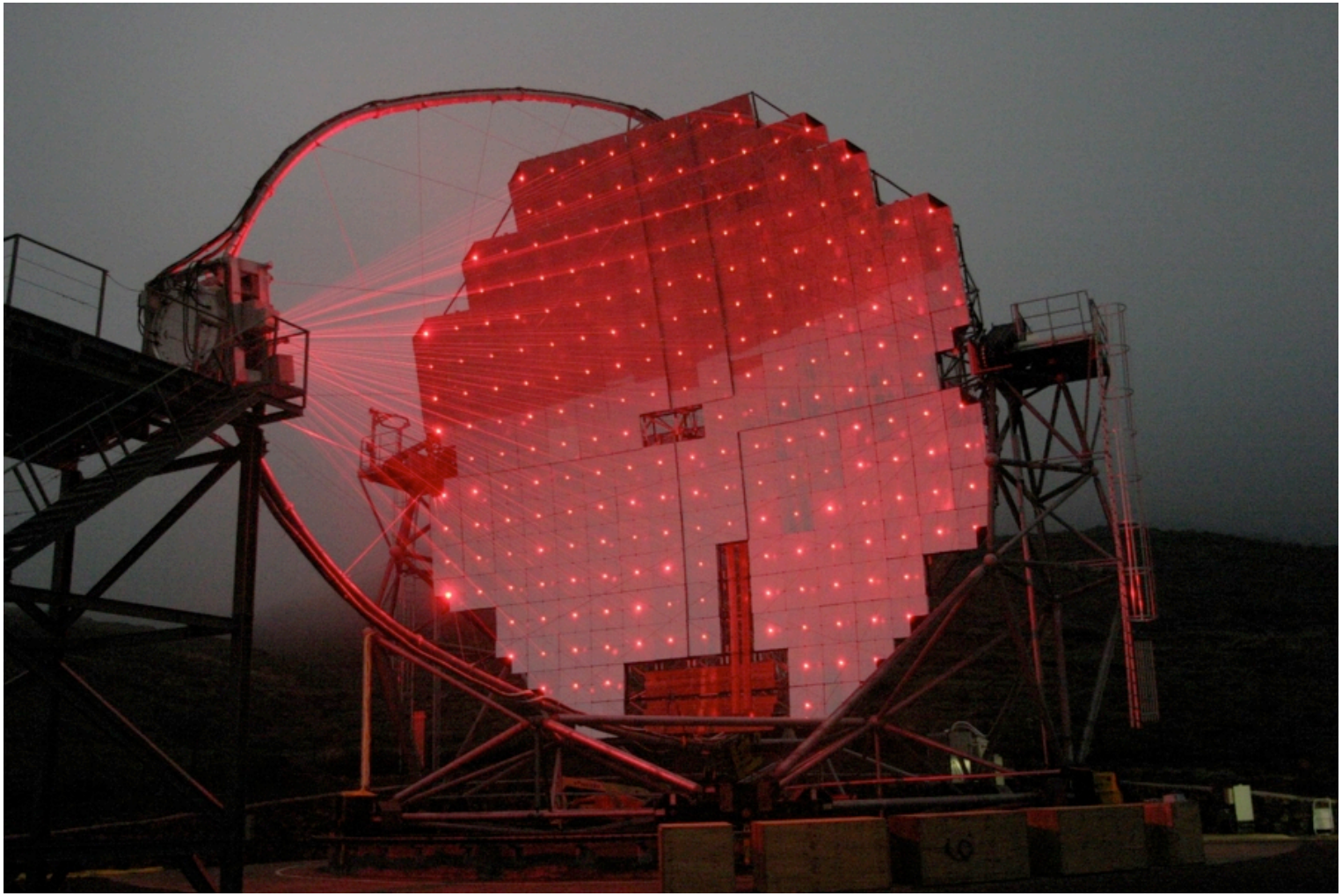
# Report from Palaiseau meeting April 2005

# MAGIC - another telescope (bigger, better camera)



# HESS - a big (35m?) telescope at array center

# CANGAROO - improved trigger, first telescope mods?

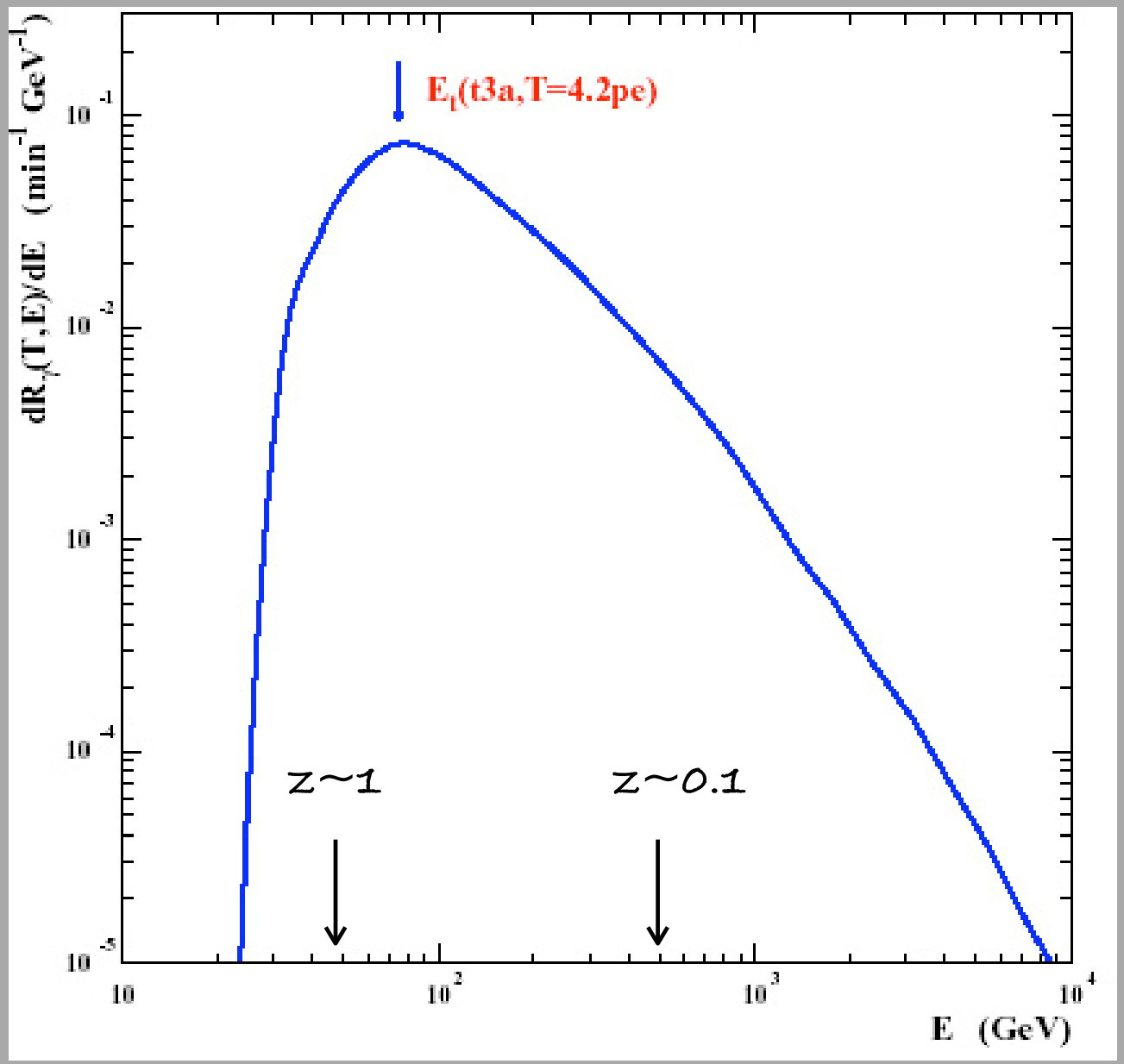
# What is Beyond VERITAS?

- Where is the interesting science?
- How do ACTs fit in the `big picture'?

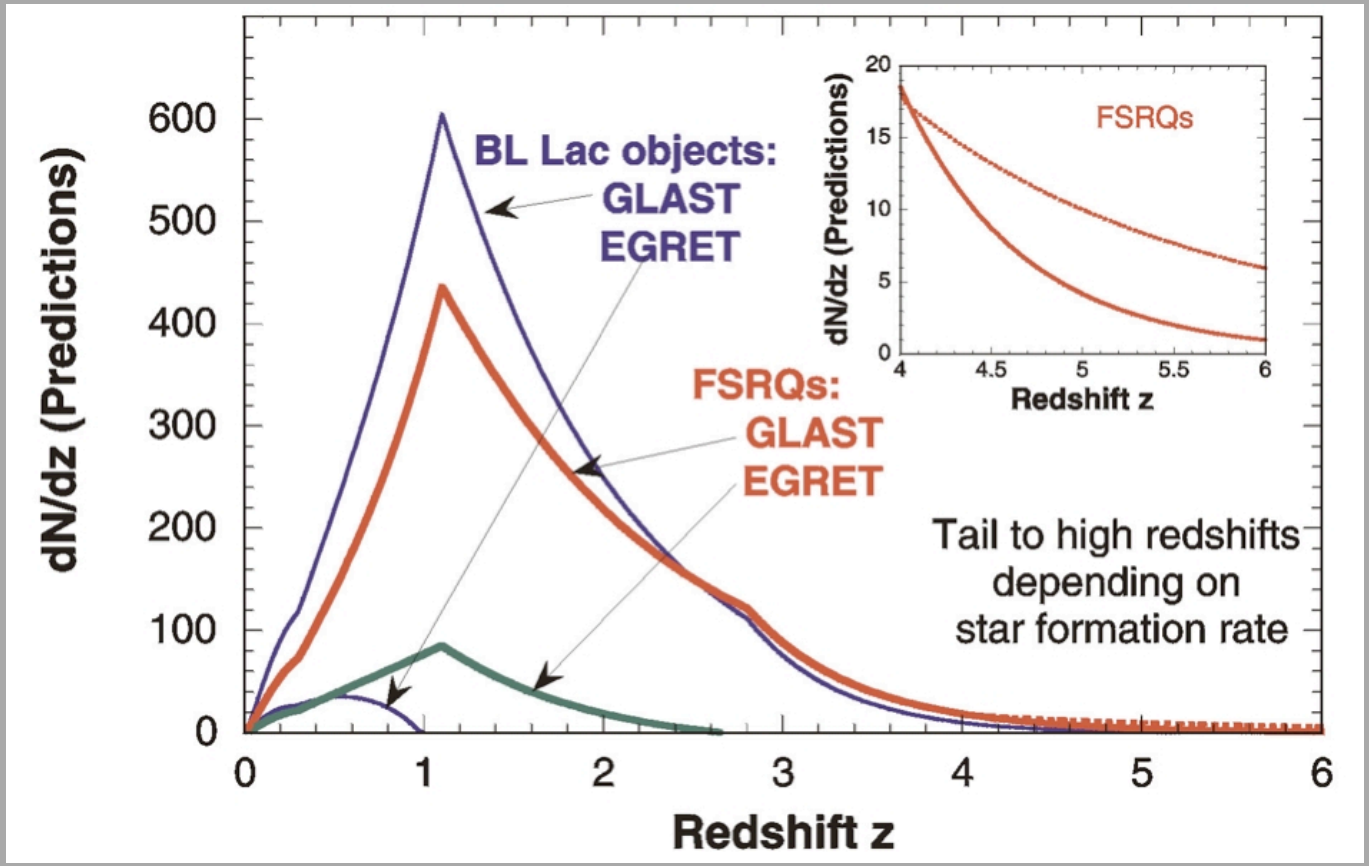
# Science Interests

- Cosmology
  - See more of the Universe in high energy gammas: further AGNs, GRBs,.....
  - Use distant objects as light sources: EBL, cascades in IGM, search for pair haloes, QG, etc.....
- Galactic Objects
  - Detect fainter objects
  - Detect, map diffuse emission

VERITAS 4 and red-shift reach



# AGNs -What could we expect?



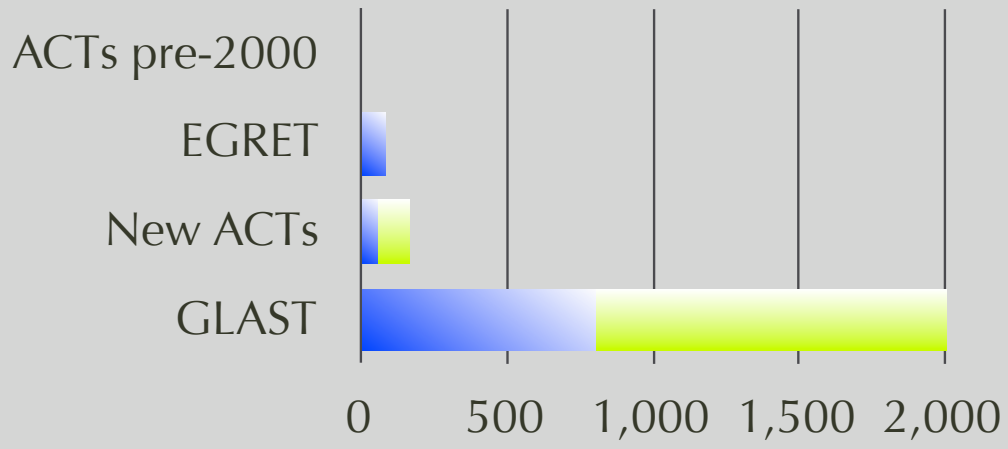

Estimate for GLAST by Dermer and Davis (1999) based on Dermer and Gehrels (1993) - talk by Dermer

# What about GLAST ?

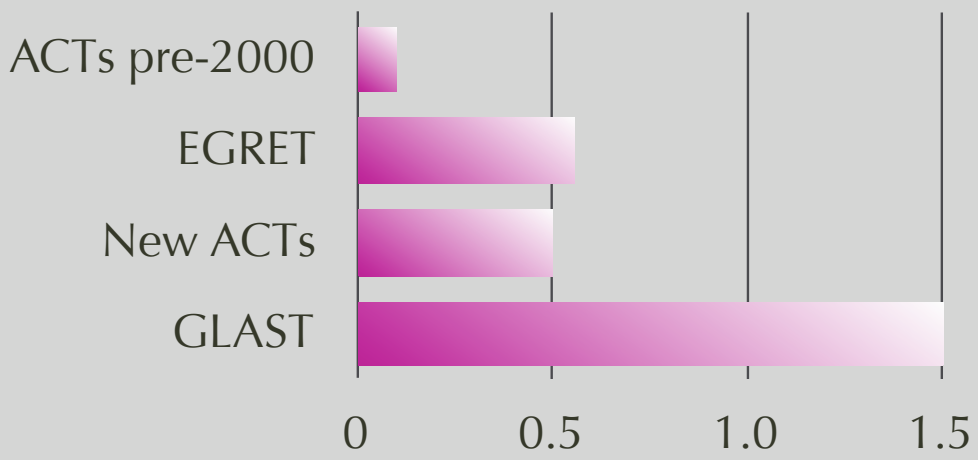
| | GLAST | ACT-2000 |
|---|---|---|
| • Area | ~ 1sq m | ~$10^5$ sq m |
| • Energy Threshold | 20MeV | ~70GeV |
| • Energy Resolution | <10% | ~10% |
| • Angular Res. | <1deg. (100MeV) | ~0.1deg.(100GeV) |
| • FOV | ~90 deg. | ~3-5 deg. |
| • Duty Cycle | ~80% | <10% |
| • Signal | Photon Counting | Background Limited |
| • Money | $100M's | $10M's |

Examples:

AGN detection rate




detected AGN redshift peak



# Objectives for beyond VERITAS

- Improve collecting area
- Improve background rejection
- Reduce energy threshold peak to below 50GeV
- Expand single telescope field of view

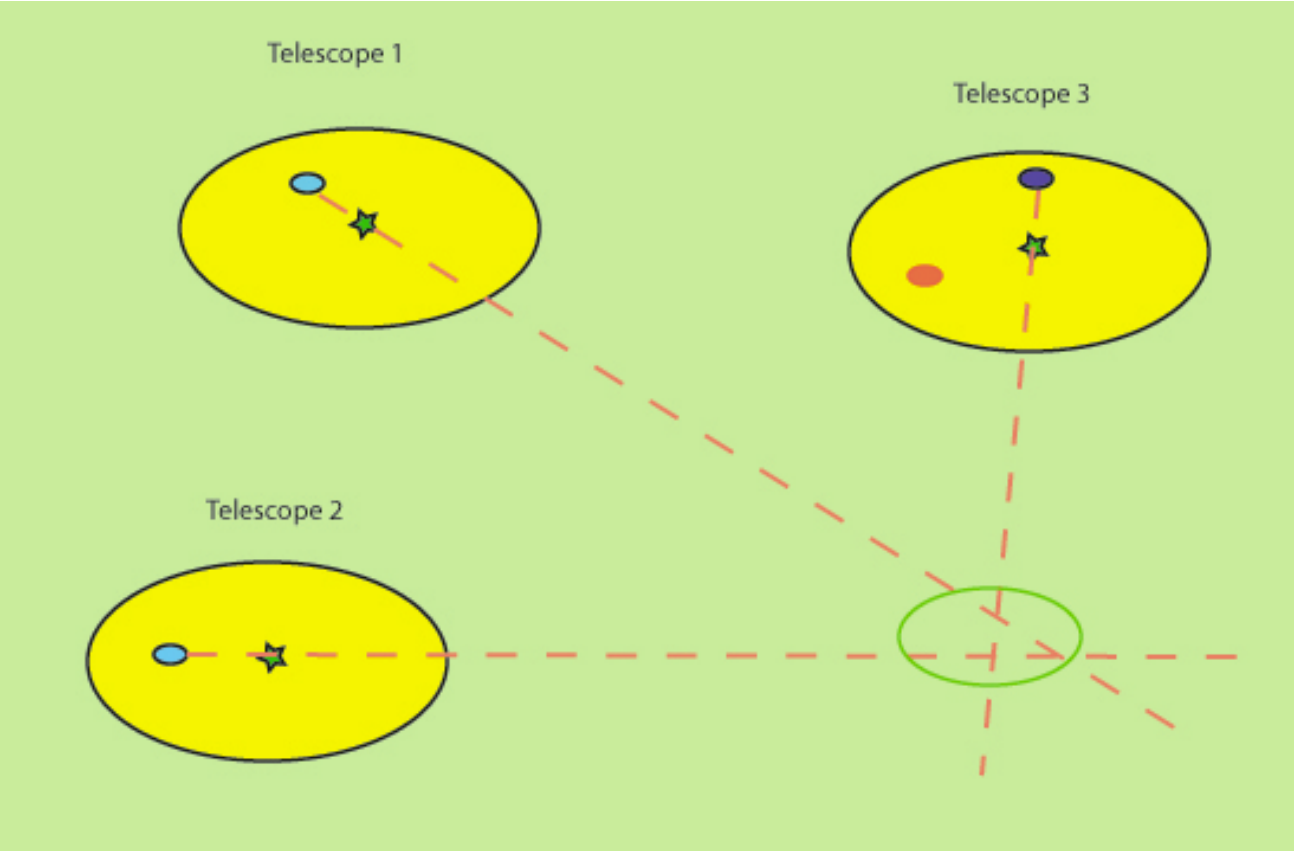
# Overall Scheme

- short term (<5yrs) Provide 3 telescopes with significantly improved capabilities at KPNO site
- longer term (~10yrs) Produce a square kilometer array of ~100 telescopes at a higher altitude site.

# 3 new sites at KPNO

picture Peter Cogan Feb 2005

- Wide FOV needs optics/focal plane development
- Large number of pixels makes FADC difficult
  - For low energy events and small angular pixels occupancy is small -> photoelectron counting possible
  - All digital pipeline possible -> Hillas “array in the sky” realization


Telescope 1
Telescope 3
Telescope 2

# Array Concepts

- square kilometer array - focussed at hi-z science -> energy region below 100GeV
- 30-100 smaller (4-6m) telescopes
- Locate at 3km(?) altitude
- High q.e. devices (Wash. U.) or "array on the sky" e.g. STAR, digital pipeline based.

# Properties of square km array

- 500x effective collecting area of VERITAS-4 at 50GeV
- 100x effective collecting area of VERITAS-4 at 100GeV
- Sensitivity of 10^-12 ergs/cm^2 s in few hours
- Ideal for observations of transient cosmological sources

# Time required for 10mCrab point sensitivity at 5 sigma

- VERITAS-4 @ 1TeV, ~50 hrs
- GLAST @ 1GeV, ~4000 hrs
- VERITAS-7 @50GeV, ~50 hours
- Square kilometer @50GeV, ~5 hours

# Workshop:
# "Ground-based Gamma-ray Astronomy: Towards the Future"

## University of California, Los Angeles

Thursday & Friday, October 20-21 2005 (Mays' Landing)
Saturday, October 22nd 2005 (UCLA: PAB)

# Summary

- Beyond VERITAS has two stages:
  - (<5 yr) 3 new larger telescopes at KPNO, completing VERITAS-7
  - (10 yr) square kilometer array at higher altitude site, requires tech development. (high q.e. or digital pipeline)