Scoping the Follow-up Effort

Josh Bloom (UC Berkeley)

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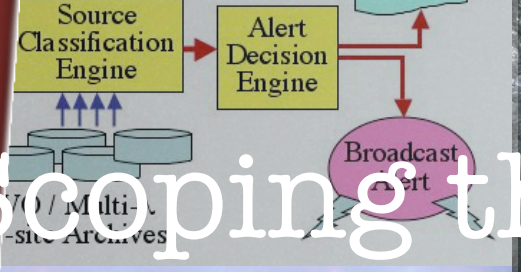
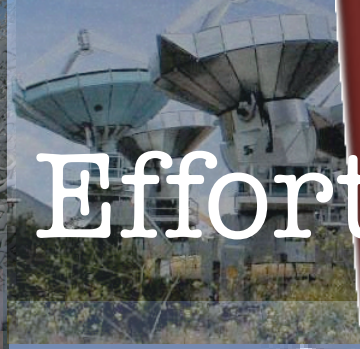
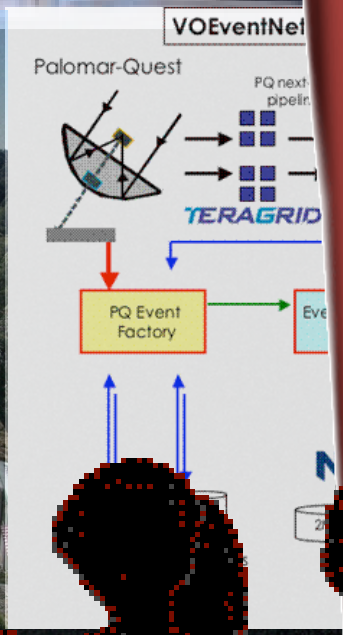
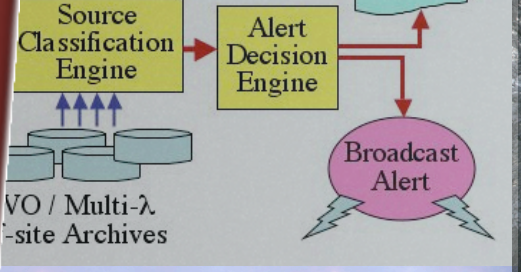
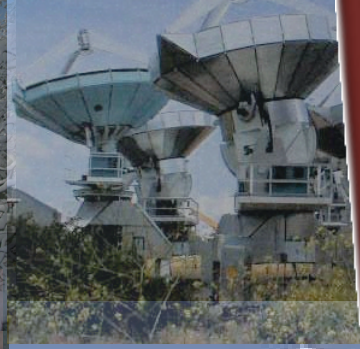


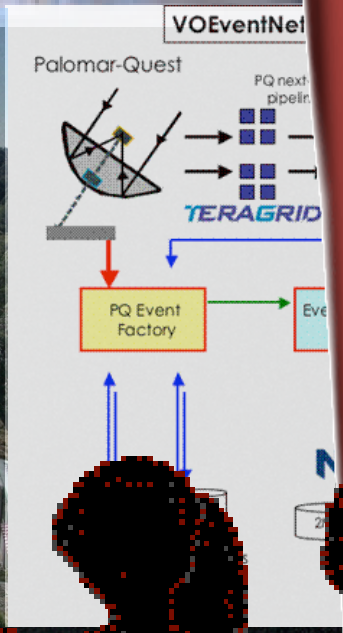





Source Classification Engine
Alert Decision Engine
Broadcast Alert
VO / Multi-λ
-site Archives




TAOS D
TAOS C
TAOS B


VOEventNet
Palomar-Quest
TERAGRID
PQ Event Factory

Discovery ≠ Follow-up

(Discovery ./. Follow-up)

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(Discovery ⁄. Follow-up)

Rarely gain physical insight
into phenomena by discovery

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3C 196 AS A SECOND RADIO STAR

THOMAS A. MATTHEWS
Owens Valley Radio Observatory
California Institute of Technology
AND
ALLAN SANDAGE
Mount Wilson and Palomar Observatories
Carnegie Institution of Washington
California Institute of Technology

Since the identification of 3C 48 with a stellar object,[1] there have arisen such questions as: What kind of stars emit strong radio emission? and How many such objects are there? Only other similar identifications can answer these questions. The second radio source to be identified with a star is 3C 196.

The identification was made possible by the highly accurate radio position that has been determined at the Owens Valley

1962PASP...74R.406M

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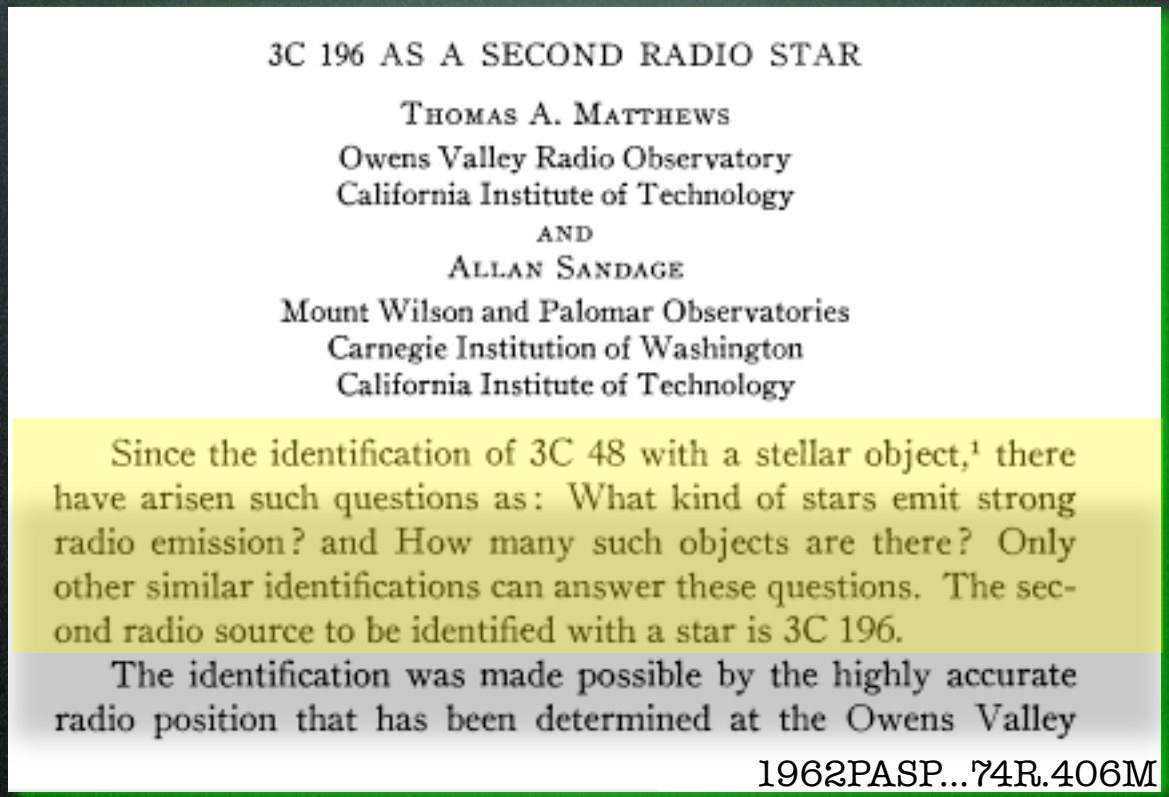

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GAMMA-RAY BURSTS FROM SUPERCONDUCTING COSMIC STRINGS AT LARGE REDSHIFTS

ARIF BABUL AND BOHDAN PACZYŃSKI
Princeton University Observatory

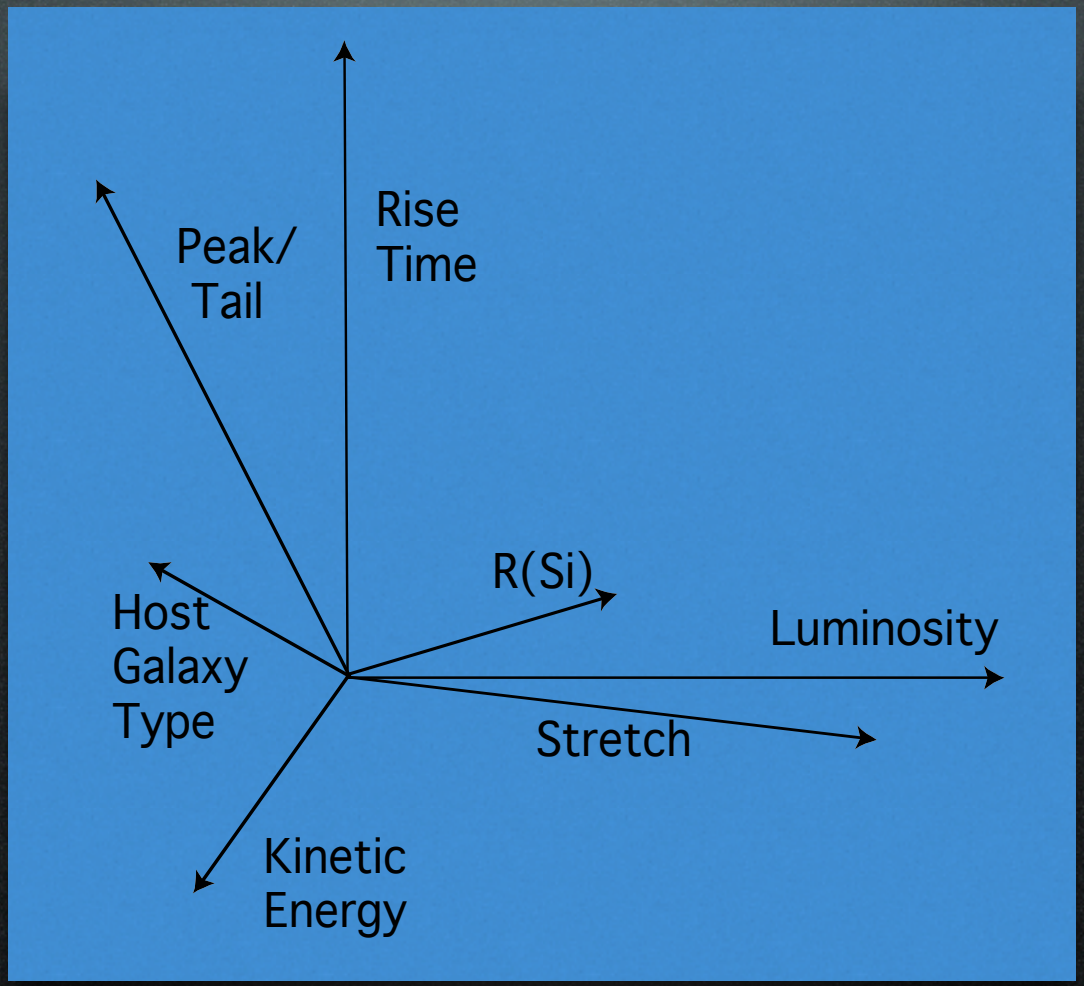
AND

DAVID SPERGEL
Institute for Advanced Study, Princeton
Received 1987 January 2; accepted 1987 February 27

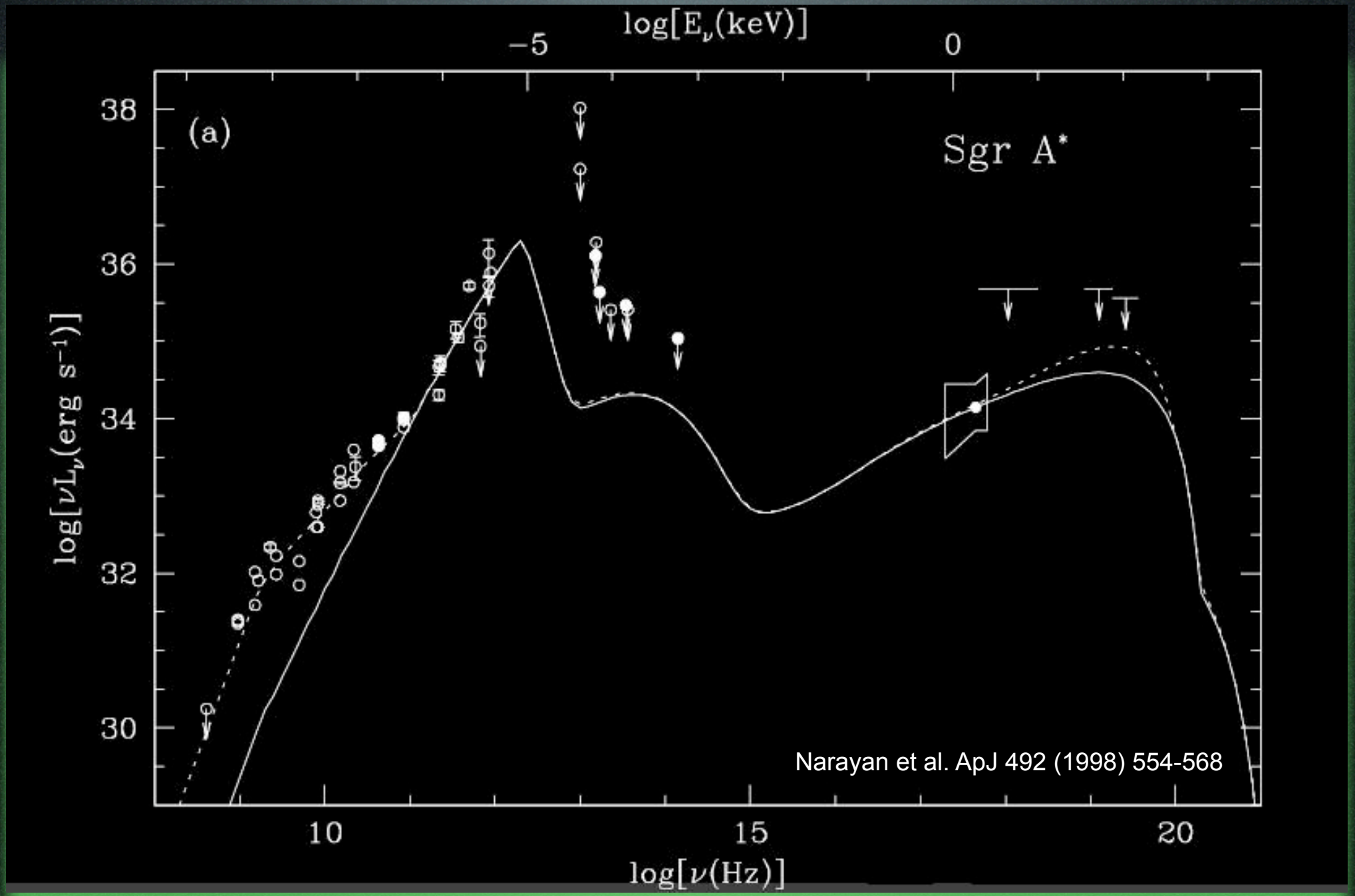
ABSTRACT

The universe is least opaque to gamma rays between 0.1 MeV and 100 MeV, and sources can be seen out to a redshift $z \approx 1000$. The only all-sky detectors that have been operating continuously for many years are sensitive to photons near 1 MeV. Spectacular and, in some cases, recurrent bursts from unidentified sources have been seen by these detectors. If the recurrence of gamma-ray bursters GB 790107 and GB 790324 is due to gravitational lensing, then the sources must be at cosmological distances.

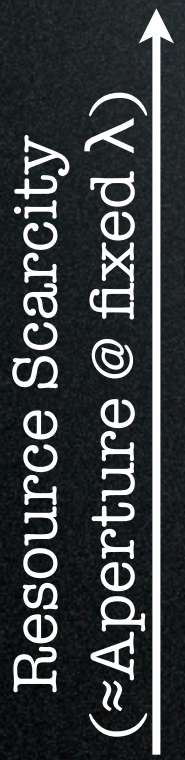
Recent developments in the theory of superconducting cosmic strings suggest that their cusps may be possible sources of very intense and highly collimated bursts of energy. A cusp at a redshift $z \approx 1000$ may give rise to an intense burst of energy with a duration of a few seconds or less. The maximum amount of energy associated with such an event is limited to 10^7 ergs cm^{-2} by causality. If only one part in 10^{11} of this energy reaches Earth as 1 MeV gamma rays, then about 100 gamma-ray bursts should be detectable every year with the existing instruments. Furthermore, microlensing of this tight beam is quite likely to produce images with dissimilar spectral and time profiles. The number of events should vary with their observed energy (fluence) according to $N \approx S^{-1.7}$ for sources not affected by gamma-ray opacity, and more slowly for fainter, i.e., more distant and partially obscured, sources.



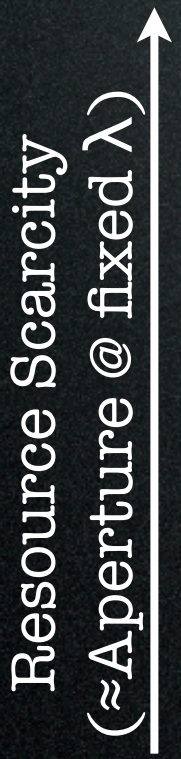
From G. Aldering


log[E$_\nu$(keV)]
−5
0
(a)
Sgr A*
38
36
34
32
30
log[νL$_\nu$(erg s^{-1})]
10
15
20
log[ν(Hz)]
Narayan et al. ApJ 492 (1998) 554-568

Follow-up Topologies

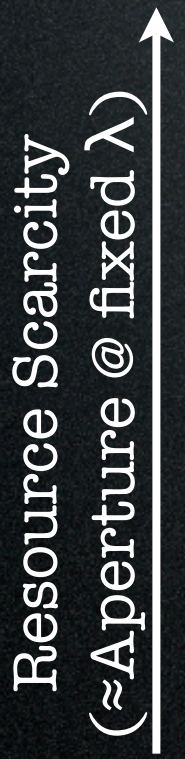


Follow-up Topologies



Tycho SN
radio pulsar
high-z SN

Follow-up Topologies



Tycho SN
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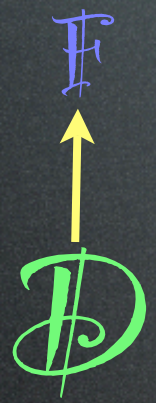
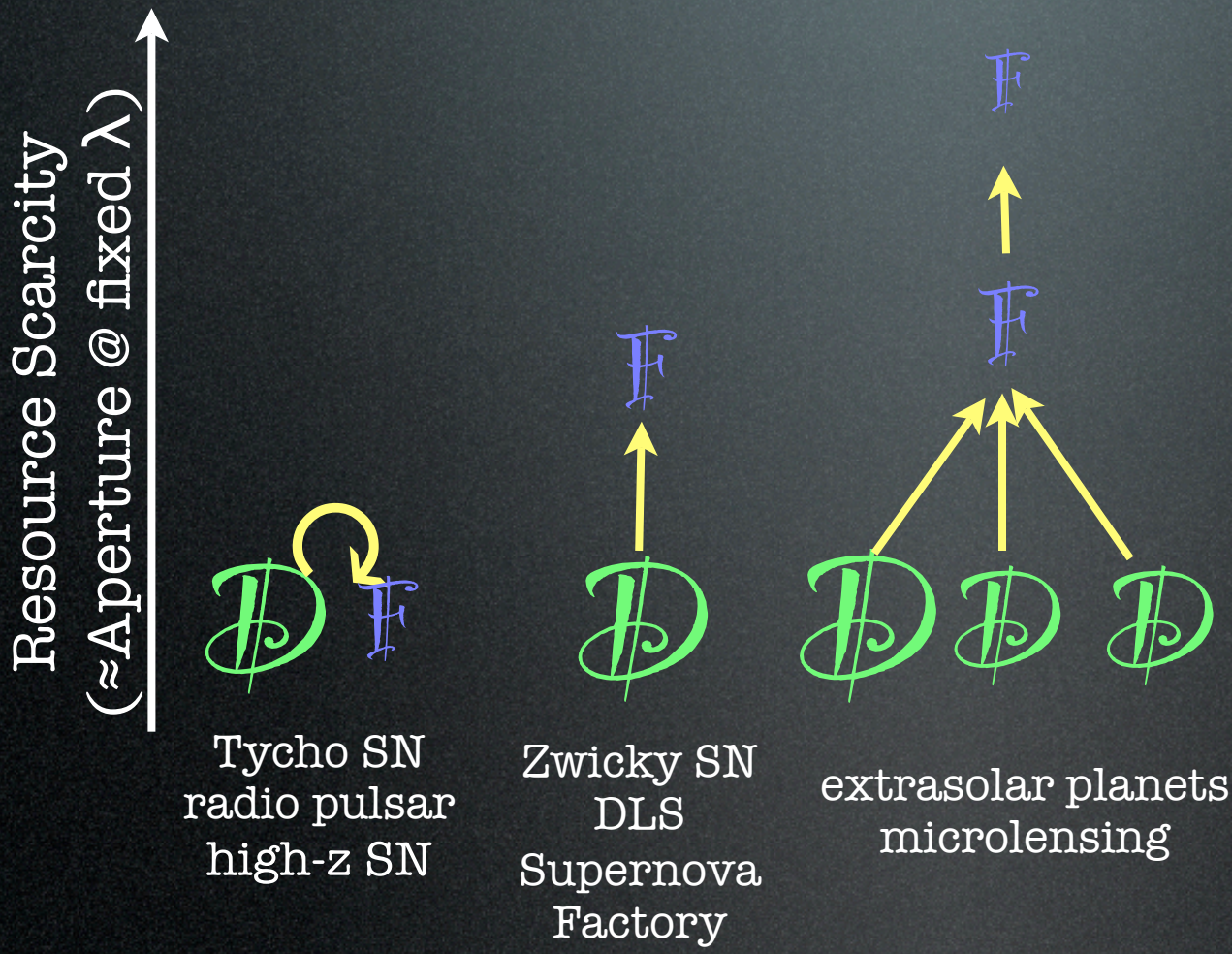


Zwicky SN
DLS
Supernova
Factory

Follow-up Topologies



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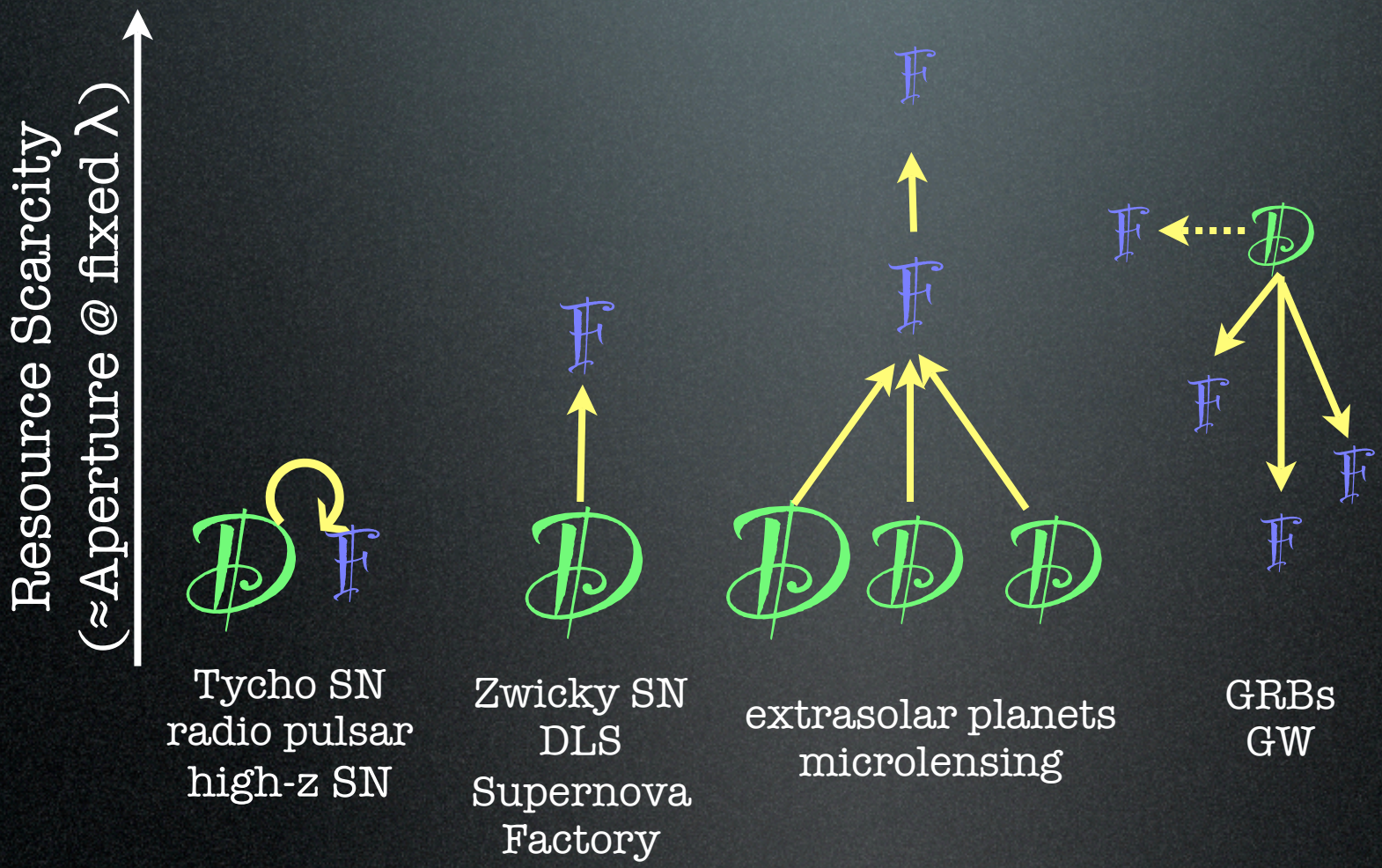
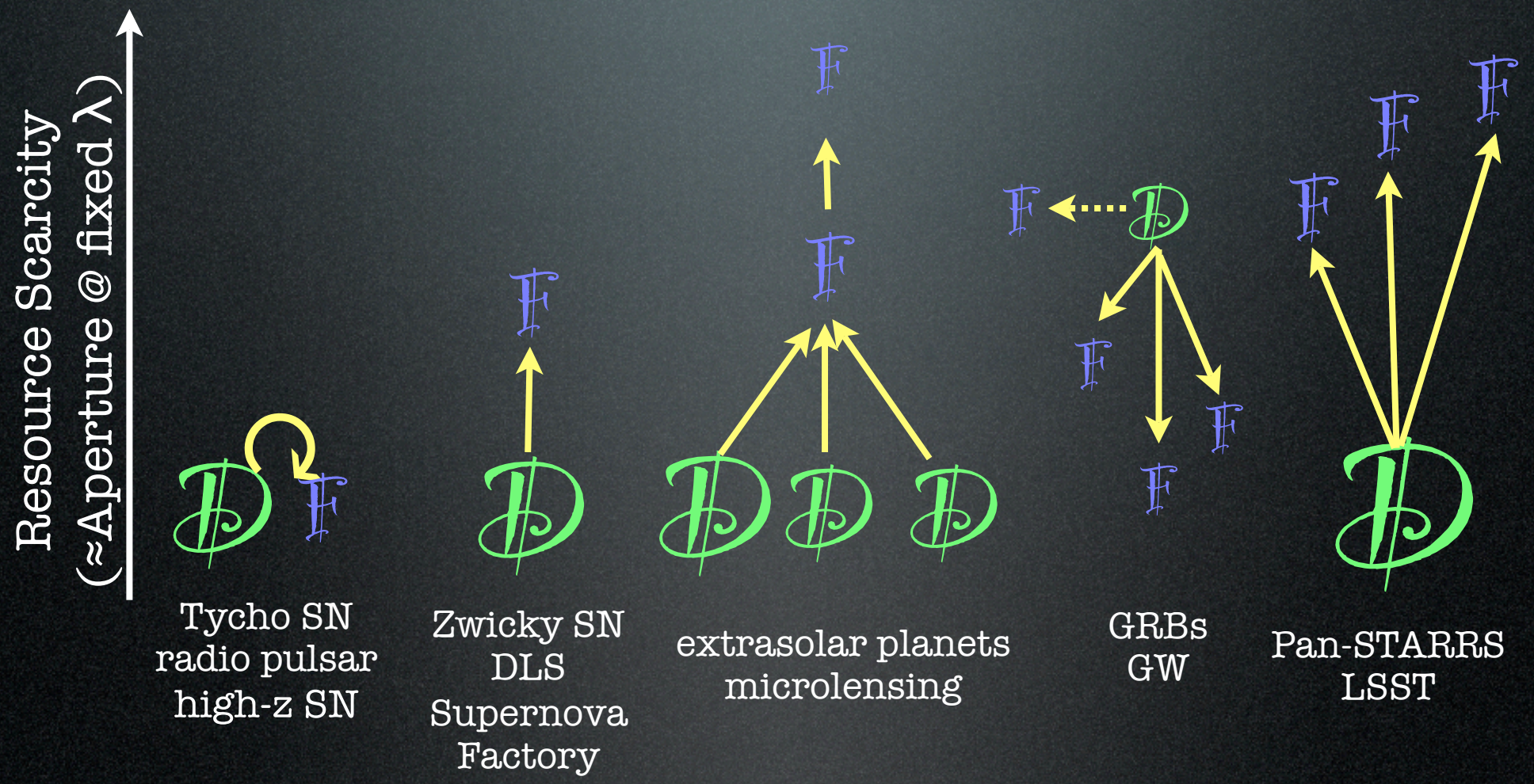
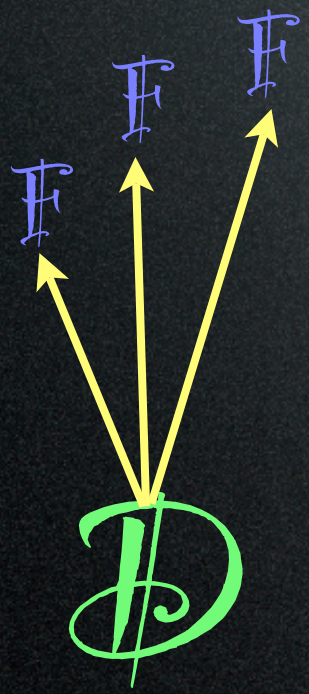


Follow-up Topologies



Resource Inversion: a Crisis for Transients?

Tom's "Tipping Point"



Pan-STARRS
LSST

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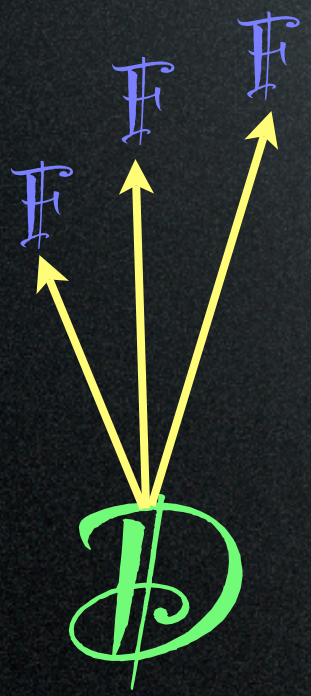

Pan-STARRS
LSST

* Scare resources as bottleneck
  1. narrow scope of follow-up
     to "self follow-up"
  2. redefine/refine follow-up priorities to match available resources
     e.g. "thinking telescopes," VOEventNet
  3. reenvision/rescope scarce resources to better suit discovery torrent

Messaging you need to know about

ASAS

ATEL

GCN

OGLE

TALONS

IAUC

SNEWS

CBAT

GMAN

AAVSO

EROS

NOVALERT

EWS

VSNET

AstroAlert

SN Neutrino Alert Net

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SN Neutrino Alert Net

VOEvent

Benchmarks in the VOEventNet

Caltech, Berkeley, Los Alamos

Simplistic Uni-directional Transport

Provider supplies VOEvent to Listener who then reacts
two physical sites, two un-connected groups

Basic Aggregation of Single Provider

DB, web-interface with ADQL, implement a push technology

First Simple Network

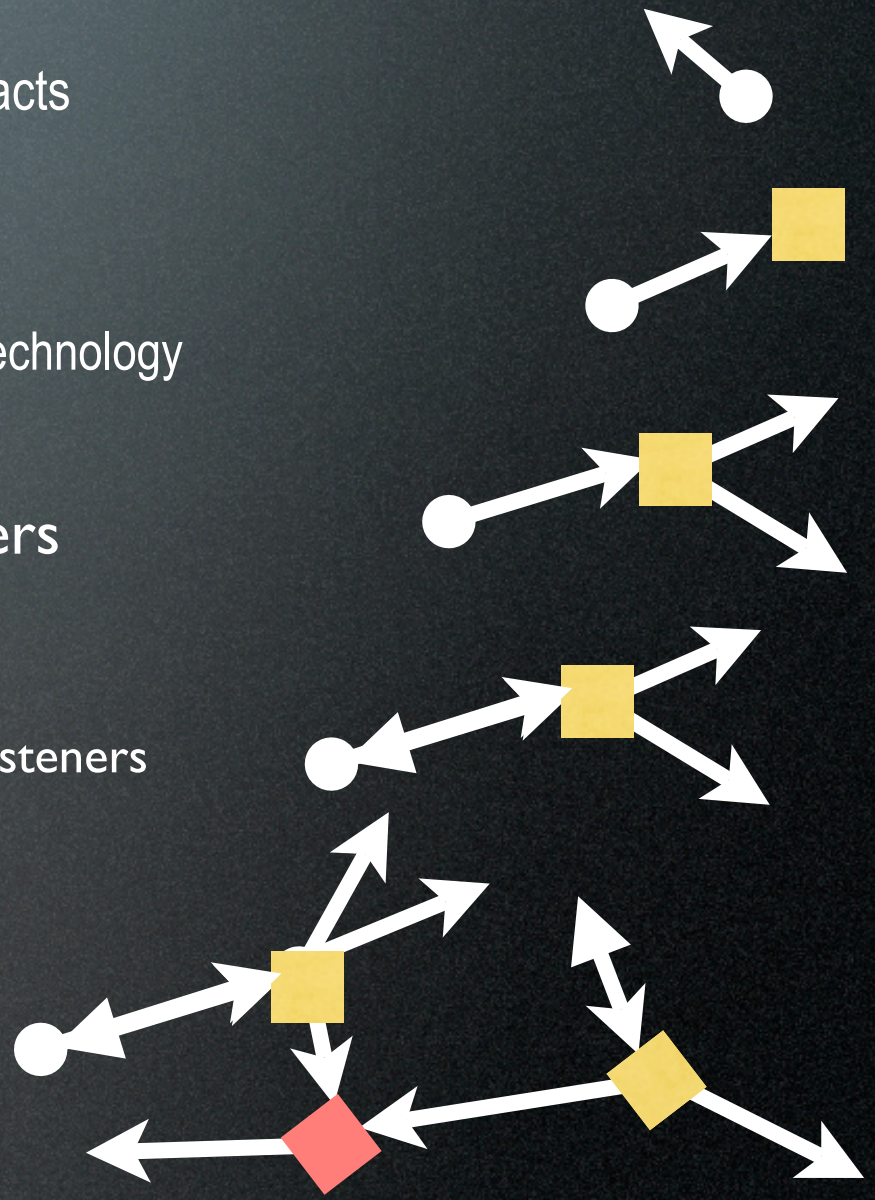
>= 1 Provider, 1 Aggregator, >1 Listeners

Simple Network with Feedback

1 Provider, 1 Provider-Listener, 1 Aggregator, >1 Listeners

Complex Network

>2 Provider, >1 Provider-Listener, 2 Aggregator,
Meta-Aggregator, >2 Listeners,
1 Listener to only a Meta-Aggregator



reenvisioning/rescoping scarce resources...

The Keck Time Domain Astronomy Working Group (TDAWG)

Charter:

1. To provide clear, science-driven strategic guidance for the development of facilities that will enhance Keck's capability in time-domain astronomy.
2. To assist in prioritization of short-term activities that will optimize the Observatory's ability to respond to time-dependent astronomical events.

What Drives Follow-up?

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Where the ACTION is?

action ≈ largest luminosity derivative

-or-

action ≈ where the photons are

What Drives Follow-up?

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action ≈ largest luminosity derivative

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action ≈ where the photons are

Where the ENERGY is?

peak in νF_ν

What Drives Follow-up?

Where the ACTION is?

action ≈ largest luminosity derivative

-or-

action ≈ where the photons are

Where the ENERGY is?

peak in νF_ν

Where you can?

Where the €€ are?

- What's your plan for "garbage treatment facility"? (i.e., do you recycle your trash?)
- What is your broadcast mechanism (discovery & follow-up)?
- What fuels your follow-up engine?
- What is state of the art follow-up now & 5 yrs from now?
- Questions for other Follow-up agents?

http://lyra.berkeley.edu/~jbloom/VP