... Entangles KICP Experiments

Auger
VERITAS
COUPP
SPT
DES

(SNfactory)

(WMAP)

SDSS

(KICP)

QUIET

EDGE

SZA

(DASIpol)

(CAPMAP)

(QUAD)
Role of KICP Theorists

• Invention of new theories for cosmological physics

Tight Connection with Experimental Projects

• Elucidation of predictions for observable phenomena
• Development and implementation of techniques to connect observations to theories
• Investigation of the discovery potential of proposed experimental projects
Theory = People

S. Carroll

It’s the year 2005... KICP theorists are still the same.
They’ll do anything to get what they need.
And they need postdocs and grad students.
Providing for the People

• A critical mass of postdocs and faculty
• An interactive environment for mentoring students
• Close contact with experimenters and observers
• Support for cross-disciplinary investigations

• A collaborative atmosphere for visitors
• Computation and infrastructure support
• A unique vehicle for disseminating research to a wide audience
Lasting collaborations involving and between visitors, postdoc and graduate alumni, graduate students not directly supported.
Case Study: Thunch

- **Thunch = Th(ursday L)unch ~ Th(eory L)unch**
  weekly discussion group and journal club

- **Postdocs (experimental too!) choose papers to read**

  Thunch Server
  
<table>
<thead>
<tr>
<th>Now Serving...</th>
<th>Billions and Billions Served...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search Keyword:</td>
<td>CMB New</td>
</tr>
<tr>
<td>specific records:</td>
<td>Dark Energy Phenomenology New</td>
</tr>
<tr>
<td>number=8675309</td>
<td>Dark Matter / Substructure New</td>
</tr>
<tr>
<td>or authors=-Jenny</td>
<td>Early Universe / Pure Theory New</td>
</tr>
<tr>
<td></td>
<td>First Objects / Reionization New</td>
</tr>
<tr>
<td></td>
<td>Galaxy Clusters New</td>
</tr>
<tr>
<td></td>
<td>Galaxy Formation/Evolution New</td>
</tr>
<tr>
<td></td>
<td>Gravitational Lensing New</td>
</tr>
<tr>
<td></td>
<td>Large Scale Structure New</td>
</tr>
<tr>
<td></td>
<td>None of the Above New</td>
</tr>
</tbody>
</table>

  Add a Paper  Recent Additions

  This database is for internal UC/KICP/FNAL use only. Please bookmark but do not link to it. Requests from external IP addresses are permitted but logged.

- **Several projects and collaborations a year come directly out of Thunch discussions**
Themes: Inflation

• Did the universe inflate? at what energy scale? How did inflation begin? arrow of time?

• Are multi-field isocurvature models and trans-Planckian modifications allowed? required?

• What will we learn about the inflationary potential beyond slow-roll?

• Can halo substructure constrain the inflationary potential? galaxy occupation modelling of clustering

• Can inflationary non-Gaussianity be measured in CMB

• Do CMB anomalies have an inflationary origin?
Themes: Dark Energy

- Dark energy or modified gravity?
- Can structure formation test brane-world models?
- Is phantom dark energy quantum mechanically stable? gravitationally stable?
- Can the dark matter and dark energy be unified?
- Can baryon oscillations in clusters test the dark energy
- Can weak, CMB, or gal-gal lensing? galaxy clustering?
- Can cluster masses for counting be calibrated with simulations? internally?
Themes: Dark Matter

- Can the (sub)structure of halos test the properties of dark matter? flux ratios in strong lensing?
- Can substructure enhance dark matter annihilation signatures? baryonic effects?
- Can the phase space distribution of the dark matter affect direct detection?
- What can we learn about the particle physics of dark matter from clusters?
- How do dark matter density measurements constrain supersymmetric parameters?
Themes: Particles at High Energies

- What is the origin of the ultra high energy cosmic rays?
- What do astrophysical observations teach us about neutrinos?
- Are their relics from phase transitions?
- How are particles accelerated astrophysically?
Case Study: CMB Lensing

- Development of reconstruction techniques directly motivated by capabilities of SPT

- Center postdocs: used techniques to study decontamination of inflationary B-modes constraining the dark energy, neutrino masses