Theoretical Physics at the Santa Cruz Institute for Particle Physics

- **Collider Phenomenology:** Haber (mainly susy, Higgs)
- **Model Building:** Banks, Dine (plus some string theory, cosmology). Especially susy, e.g. gauge mediation.
- **Particle Astrophysics:** Profumo -- dark matter, baryogenesis. Connections to collider physics. Aguirre, Primack: closer to traditional astrophysics, including galaxy formation, interstellar medium...
Two postdoctoral fellows, typically one in “phenomenology”, one in more formal physics. New: Sebastian Grab, expert in collider phenomenology and relevant tools.

Approximately four graduate students.
SCIPP Theorists and Experimentalists

- Close ties. E.g. with Seiden, Nielsen, Lidtke on ATLAS physics including Higgs and susy issues, large extra dimensions, photon and other signals particular to gauge mediation.
- Close ties to FERMI collaboration, esp. Profumo.

These ties will become more important as LHC becomes fully operational.
The Relationship to SLAC

- For over two decades: theorists have maintained offices at SLAC and have spent several days every month at SLAC (faculty, postdocs, students). A source of stimulation in both directions.
- During LHC running, expect this connection to be vital.
Expected role of SLAC for SCIPP Theorists During LHC Running

- Anticipate weekly visits to SLAC. Regular discussions of latest results with SLAC theorists, faculty and postdocs. Expect that this will be "two way", as we interact with ATLAS collaboration members at SCIPP.
- Exchange of ideas; collaborations.
- Developing expertise in use of analysis and computational tools.
Who will play which roles

- Haber and new postdoc Sebastian Grab most “up to speed” on use of full range of analysis tools. Anticipate collaboration with SLAC faculty, staff, postdocs. Depending on nature of discoveries (e.g. of potential dark matter candidates), Profumo also anticipated to play such a role.

- Banks, Dine: have been less vigorous in acquiring needed skills, and will need and want more assistance. Anticipate participation in miniworkshops, advice and assistance from SLAC faculty (esp. Peskin, Dixon, Wacker, others)
A Scenario for Dine

- Evidence for new physics discovered relatively early in LHC running. Consistent with susy, other possibilities.
- Dine has constructed an array of gauge mediated models which predict qualitatively different spectra. With students, postdocs, will seek to determine if results consistent with any; what future tests may be accessible.
What would we wish, expect from SLAC Theory

- Regular seminars, miniworkshops on latest experimental and relevant theoretical developments.
- Regular pedagogical presentations, accessible to students and interested faculty and postdocs, on analysis tools, physics issues.
- An active visitor program bringing expertise from other institutions and in appropriate areas.