

2000 Michelson Wrap-Up

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Something to Keep in Mind...

- My Favorite Bohr Quote:
 - “Never express yourself more clearly than you think...”
 - Made in the context of a *PhD* exam...
- I’ll be looking for audience participation

The 2000 Michelson Summer School

- Emphasis on near-term scientific opportunities with long-baseline interferometers
- Oriented around existing/ongoing/viable programs
- Provide a realistic view of where interferometry can (and cannot) make a contribution to the science
- Mildly break the “Mozurk” dictum: Fervently state that what you *can* do is interesting

Stellar Astrophysics

- The Science Motivating Most Interferometers is Stellar Astronomy
 - Understanding the stars themselves
 - Constraining models of their
 - Formation
 - Structure
 - Function
 - Evolution
 - Exploring associated phenomenon
 - Chemical evolution
 - Multiplicity
 - Companions (stellar and sub-stellar)

Monday -- Theory of Stellar Evolution

- Stellar Interferometers -- T. ten Brummelaar & P. Lawson
- Introduction to Stellar Evolution -- E. Bohm-Vitense
 - Stellar mass \Rightarrow stellar properties
 - Luminosity $\sim M^{3.5 - 3.8}$, Lifetime $\sim M^{-2.5}$
- Overview of Star Formation -- F. Shu
 - Angular momentum problem
- Mechanics (& Chemistry & Convection) of Late Stellar Evolution -- C. Sneden
 - T_{eff} solution to the O “abundance problem”
 - Angular diameters for several thousand Pop II K giants
- Our Idea was to Frame the Discussion of Stars as Interesting Objects

Tuesday -- Studies of Single Stars

- Why We Study Single Stars -- J .Davis
 - Interferometry “bread and butter”
 - Angular diameter + Bolometric flux $\Rightarrow T_{\text{eff}}$
- Pulsation Mechanisms -- M. Scholtz
 - Stars as boundary value problems
- Stellar Atmospheres: Structure, Composition, and Limb Darkening -- M. Dyck
 - Consequences of internal temp and material structure of star
- Stellar Surface Structure -- A. Brown
 - “Challenging” dynamic range problem
- Circumstellar Mass Loss -- B. Danchi
- Review of Measurement Prospects -- J. Davis
 - ~300 diameters measured (MS underrepresented)
 - Cepheid pulsation detection

Outstanding Problems

- Angular Sizes of Stars (T_{eff} Calibration)
 - Lower MS stars
 - Cepheids (Norgren et al 2000, Lane et al 2000)
 - Miras
 - Pulsation mode (fundamental vs first overtone)
 - Wavelength-dependent limb structure (Thompson et al 2000)
 - (Where is the theory broken and need observational constraint?)
 - Metal-poor giants
- Limb Darkening
- Stellar Surface Features

Wednesday & Thursday -- Binary Stars

- Why We Study Binary Stars -- H. McAlister
 - Mass, mass, mass
- Fundamental Stellar Parameters -- C. Hummel
 - Mass, radius, luminosity
 - Eclipsing binaries set the standard
- Radial Velocity Studies -- R. Griffin
- Multiplicity Statistics & Binary Formation -- R. Mathieu
 - Potential differences between field & PMS multiplicity
 - Star formation == binary formation?
- Closer Look at Interacting Binaries -- V. Trimble
 - Physics *and* stamp collecting
- Review of Prospects: Speckle -- H. McAlister
- Review of Prospects: Long-Baseline -- A. Boden

Outstanding Problems

- Stellar Parameter Determinations
 - Systems not well represented in EB
 - Giants and subgiants, Metal poor systems
 - Low mass systems, PMS systems
 - Luminosity calibrations
 - Window that's closing with astrometric satellites
- Interacting Binaries
 - Angular momentum evolution
 - Imaging
 - In lines? At what angular scale? With what dynamic range?
- Binarity itself
 - **Star formation == binary formation?**
 - Orbital element distributions (*evolution*)
- Impact of Speckle/AO?

Thursday -- Stellar Companion Detection

- Radial Velocity Detection Studies -- D. Fischer
 - Planets, planets, planets
 - No brown dwarfs
 - Multiple planetary systems
- Planet Formation -- J. Lissauer
 - Kant/Laplace model
 - Terrestrial/Gas Giant formation
 - Planetary migration
- Astrometric Detection Techniques -- M. Shao
 - Ground-based astrometric detections
 - KI, VLTI
 - Space-based astrometric detections
 - FAME, SIM, GAIA
 - Coplanarity in multiple systems (Laughlin & Adams, v And)

Friday -- Future Applications of High Performance Imaging/Astrometry

- Exozodiacal Dust -- C. Beichman
- Planetary Spectroscopy -- W. Traub
- AGN -- H. Rottgering
 - Galaxies
 - AGN
- Astrometric Gravitational Microlensing -- A. Gould
 - One of my favorites...
 - (Perhaps) only contribution to dark matter problem
- Galactic Dynamics -- K. Johnston
 - Relative contributions of FAME, SIM, GAIA?

What Would You Like to Add?

- This Space Left Intentionally Blank...

What Would I Like to Leave You With...

- Stellar Astronomy Is Alive (and Well? In US?)
 - Long-baseline interferometry has/is/will make significant contributions in next 5--10 years
 - But has to be combined with (and assessed in the context of) other techniques:
 - Spectroscopy
 - Photometry
 - *Speckle/AO Imaging*
 - Radio Interferometry
- Most Applications Beyond Stellar Astrophysics are Futuristic, But Surely Will Come
 - Galactic dynamics?
 - AGN observations (low contrast outside lines...?)
- Interferometers Are Technologically Challenging, but Rewarding Devices

For Sale...Cheap!

- 1997 Dell Inspiron 3200
 - 233 MHz Pentium II
 - 144 Mbytes Ram
 - 6 Gbyte HD
 - DVD drive
 - Win98 and Linux dual-boot

- Contact me...