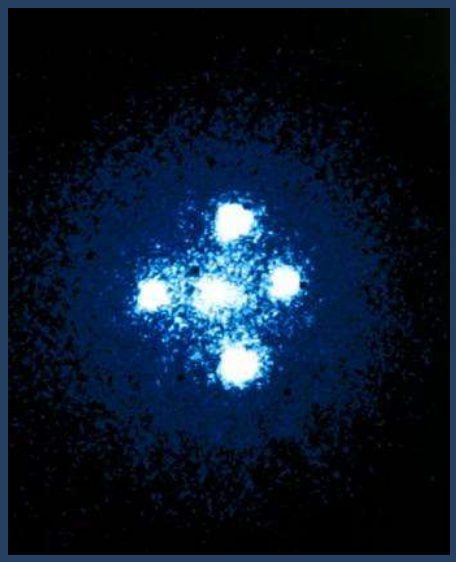
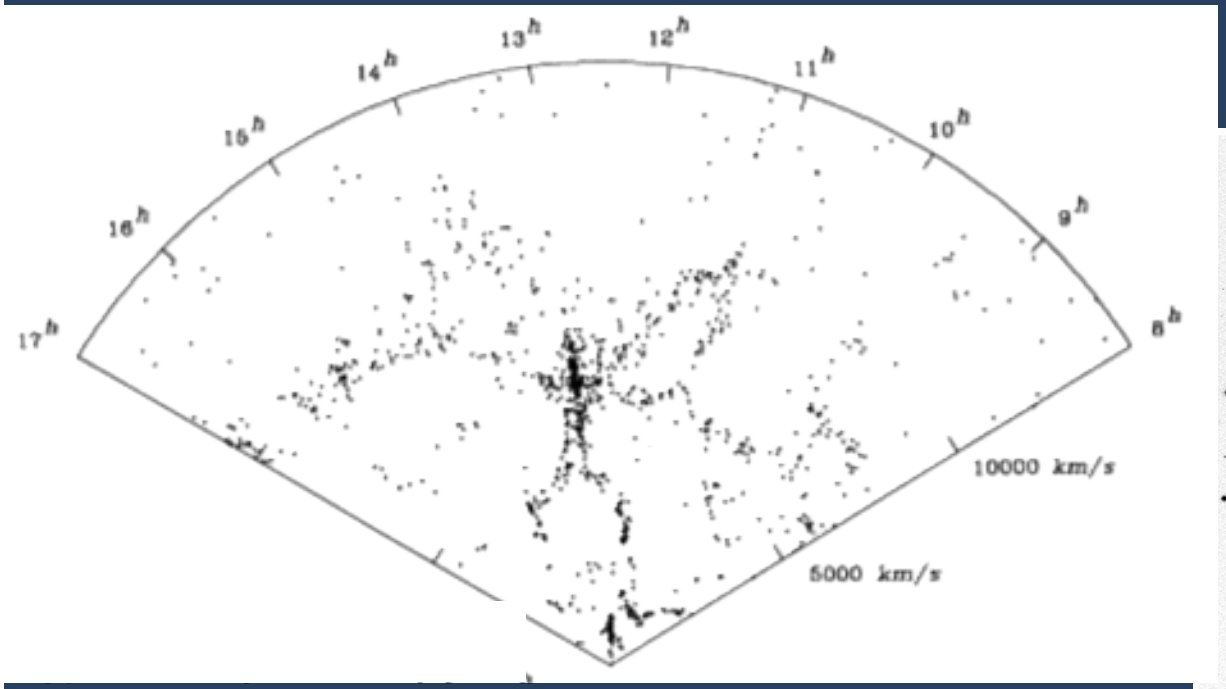
John Huchra: from stars to galaxies to the universe



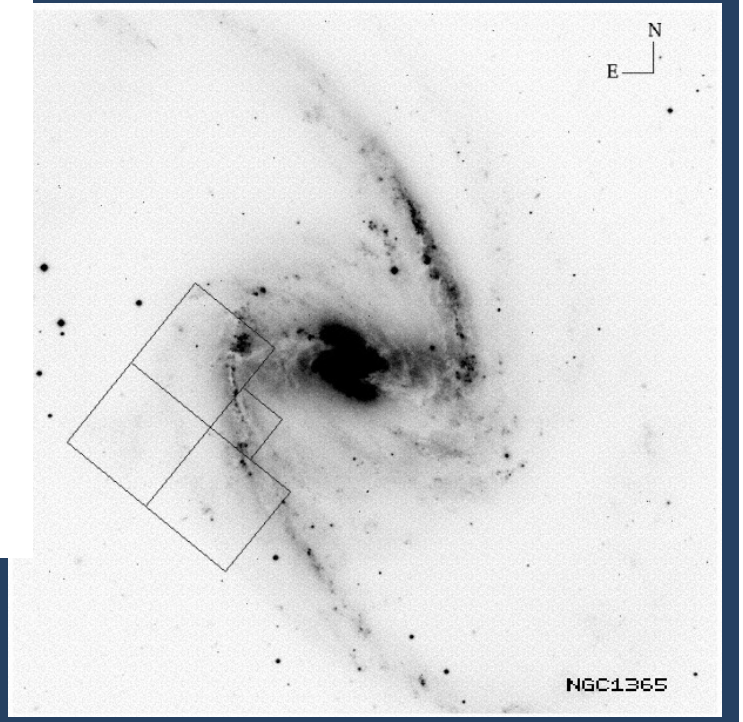
Pauline Barmby

University of Western Ontario

John's best-known work is on galaxy redshift surveys (with M. Davis, M. Geller & others) and the distance scale



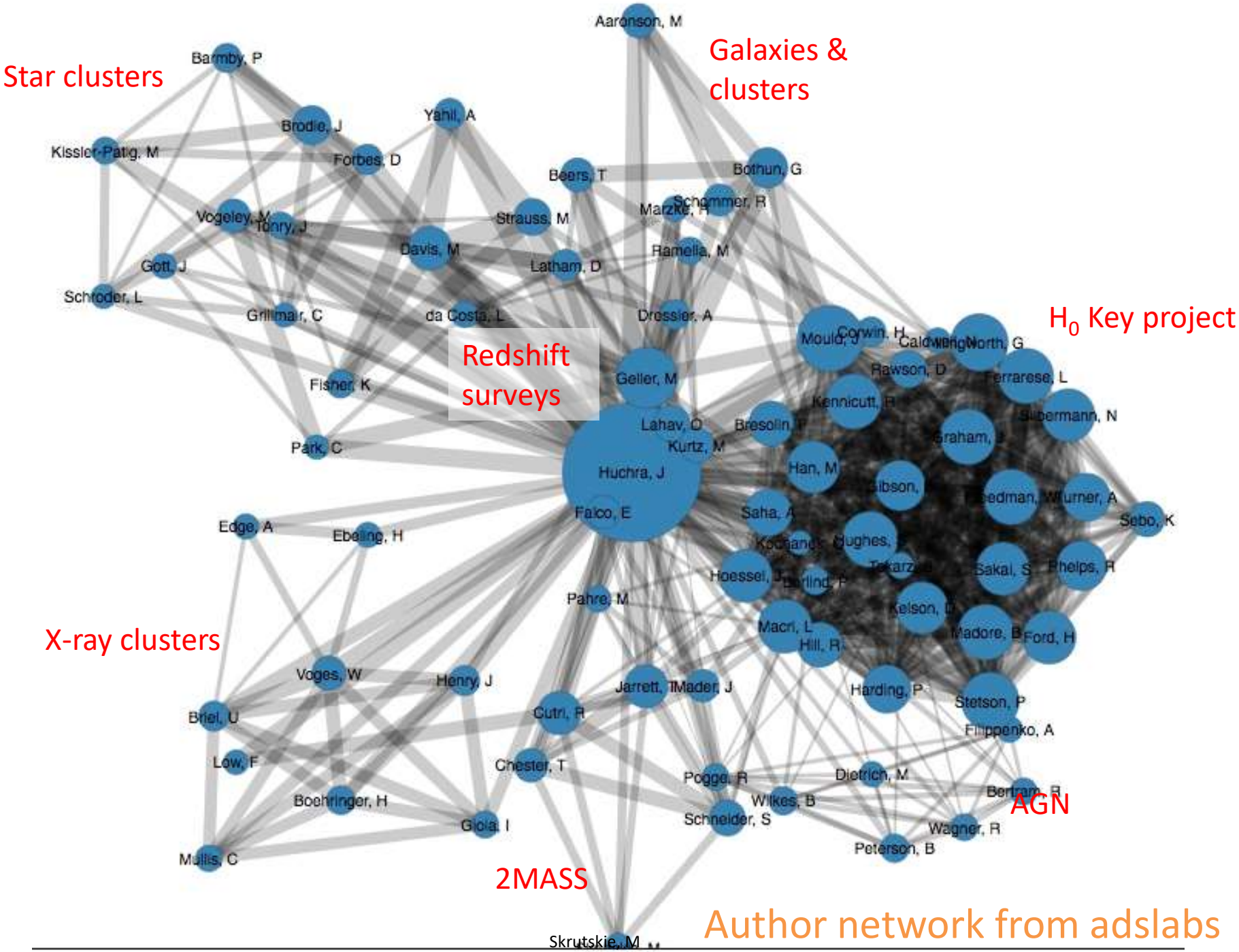
de Lapparent, Huchra & Geller 86



Huchra CfA webpages

John's ADS keyword distribution shows that he worked on a lot of topics

- galaxies: clusters (71)
- red shift (69)
- surveys (45)
- galaxies (40)
- mass function (40)
- stars: luminosity function (40)
- cosmology: distance scale (36)
- astronomy: infrared (33)
- methods: data analysis (27)
- techniques: photometric (27)
- cosmology: miscellaneous (26)
- techniques: spectroscopic (26)
- astronomy: X rays (25)
- catalogs (25)
- galaxies: structure (24)
- velocity distribution (22)
- stars: variables (19)
- galaxies: active (18)
- spatial distribution (18)
- galaxies: evolution (17)
- methods statistical (17)
- models (16)


Star clusters
Galaxies & clusters
Redshift surveys
H_0 Key project
X-ray clusters
2MASS
AGN
Aaronson, M
Barmby, P
Brodie, J
Yahil, A
Kissler-Patig, M
Forbes, D
Beers, T
Bothun, G
Schommer, R
Marzke, R
Vogeley, M
Tonry, J
Strauss, M
Davis, M
Ramella, M
Gott, J
Latham, D
Schroder, L
Grillmair, C
da Costa, L
Dressler, A
Mould, J
Corwin, H
Caldwell, J
North, G
Rawson, D
Ferrarese, L
Fisher, K
Geller, M
Kennicutt, R
Lahav, O
Bresolin, F
Graham, J
Park, C
Kurtz, M
Huchra, J
Han, M
Falco, E
Saha, A
Edge, A
Ebeling, H
Hoessel, J
Sakai, S
Phelps, R
Pahre, M
Macri, L
Hill, R
Madore, B
Ford, H
Voges, W
Henry, J
Jarrett, T
Mader, J
Harding, P
Stetson, P
Briel, U
Cutri, R
Filippenko, A
Low, F
Chester, T
Pogge, R
Dietrich, M
Boehringer, H
Wilkes, B
Bertram, R
Schneider, S
Gioia, I
Wagner, R
Mullis, C
Peterson, B
Skrutskie, M
Author network from adslabs

His first paper as an undergrad was on stars

THE ASTROPHYSICAL JOURNAL, 162:L43–L44, October 1970

ON THE HELIUM ABUNDANCE IN THE ENVELOPES OF THE BLUEST RR LYRAE STARS IN GLOBULAR CLUSTERS

ICKO IBEN, JR., AND JOHN HUCHRA
Massachusetts Institute of Technology
Received 1970 August 19

ABSTRACT

Linear pulsation calculations which include radiation pressure result in a higher surface temperature for the blue edge of the instability strip. This reduces estimates of helium abundance by $\Delta Y \sim 0.06$ to $Y \sim 0.26$–0.29.

Christy (1966) has shown that the location of the blue edge of the theoretical instability strip is a sensitive function of the assumed helium abundance in the envelope. For luminosities and masses appropriate for RR Lyrae stars in globular clusters he finds that a change in Y is related to a change in surface temperature at the blue edge by $\Delta Y \sim 5.5\ \Delta \log T_e$.

Sandage (1969) has applied a modified form of this relationship and Christy's normalization to estimate $Y \sim 0.32$ for RR Lyrae stars in M3, M15, and M92.

We have computed pulsation characteristics for a large series of models with compositions $Y = 0.2, 0.3$; $Z = 0.0001, 0.001, 0.002, 0.01$, and with masses $M/M_\odot = 0.5, 0.6, 0.7$ over the luminosity range $\log (L/L_\odot) = 1.2 \rightarrow 2.8$. We have solved exactly (numerically) the linear nonadiabatic equations (Baker and Kippenhahn 1965). For opacity we have used Christy's analytic approximation to Cox-Stewart tables. Thermodynamic variables are correct versions of those given by Iben (1963, 1965) with radiation pressure included.

We find that the location of the blue edge for first harmonic pulsation is essentially the same whether convection is omitted or included in the mixing-length approximation ($l/H_{pres} \sim \frac{1}{2}$).

The location of the blue edge is relatively insensitive to the choice of $Z \leq 0.002$, as suggested by Christy. It does, however, depend on changes in Z for $Z \geq 0.005$. We find that the location of the blue edge is much less sensitive to changes in mass and somewhat more sensitive to changes in Y than found by Christy. At luminosity levels of interest, we obtain $\Delta Y \sim 3\ \Delta \log T_e$.

A major result of our study is that the blue edges for first harmonic pulsation and for pulsation in the fundamental are uniformly bluer than found by Christy. For $Z = 0.002$ and $\log L \sim 1.6$, our first harmonic edge is bluer by $\Delta \log T_e = 0.02$ than Christy's. Half of this difference may be due to our inclusion of radiation pressure in the calculation of thermodynamic quantities. The other half may be due to a difference in the surface boundary conditions.

On the assumption that we know the value of $\log T_e$ for the bluest RR Lyrae variables in a cluster, the value of Y obtained by using our results is less than the value obtained by using Christy's. Adopting Sandage's choice for $\log T_e$, we conclude that a mean value of $Y \sim 0.32 - 3 \times 0.02 \sim 0.26$ is appropriate for variables in M3, M15, and M92.

Strom (1969) has argued that the inclusion of convection alters the conventionally used relationship between $B - V$ and $\log T_e$. He suggests that, for a given $B - V$ near the blue edge, $\log T_e$ should be larger by perhaps ~ 0.01. Again using Sandage's estimates and our results, we have $Y \sim 0.26 + 0.03 \sim 0.29$.

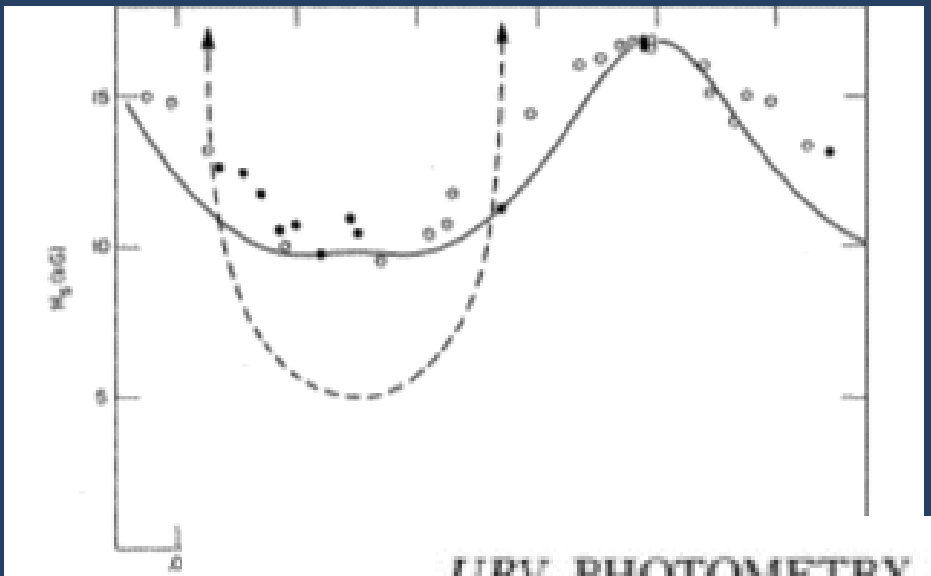
All of these values for Y should be compared with the value of $Y \sim 0.29 \pm 0.05$ found by Iben *et al.* (1969), who used an entirely independent procedure (Iben 1968, 1970; Iben and Rood 1969) based on the comparison between properties of evolutionary models and cluster characteristics other than those used in the Christy-Sandage approach. Comparison should also be made with the value of $Y \sim 0.26$ found for solar models by using the "best" available input parameters and input physics (Abraham and Iben 1970).

REFERENCES

Abraham, Z., and Iben, I., Jr. 1970, unpublished results.
Baker, N., and Kippenhahn, R. 1965, *Ap. J.*, **142**, 868.
Christy, R. F. 1966, *Ap. J.*, **144**, 108.
Iben, I., Jr. 1963, *Ap. J.*, **138**, 452.
———. 1965, *ibid.*, **141**, 993.
———. 1968, *Nature*, **220**, 143.
———. 1970, *Sci. Am.* (July), p. 27.
Iben, I., Jr., and Rood, R. T. 1969, *Nature*, **223**, 933.
Iben, I., Jr., Rood, R. T., Strom, K. M., and Strom, S. E. 1969, *Nature*, **224**, 1008.
Sandage, A. R. 1969, *Ap. J.*, **157**, 515.
Strom, S. E. 1969, *Ap. J.*, **156**, 177.

Iben & Huchra 1970

As were several papers from his grad student days



``An Analysis of the Magnetic Field of 53 Cam and its Implications for the Decentered Dipole Rotator Model'', Huchra 1972

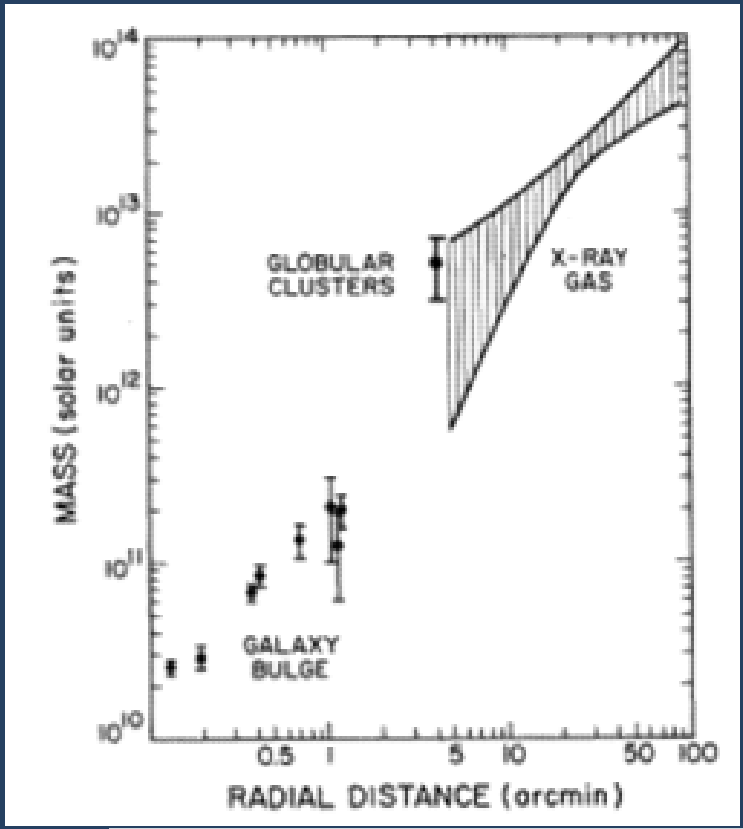
UBV PHOTOMETRY OF SELECTED Ap STARS

JOHN HUCHRA AND S. P. WILLNER
Hale Observatories, Carnegie Institution of Washington, California Institute of Technology

org/newscenter/ and I hope you will be as enthusiastic as I am! Kepler is up and running and has the capability to detect Earth-like planets. Its initial results, are impressive, as an old peculiar A star photometrist I thought I would never see the day when photometric errors were measured in micro-magnitudes but that day is here. Herschel-Planck is up and producing spectacular far-IR images, with

AAS Newsletter, Nov/Dec 2009

He worked extensively on extragalactic star clusters with Jean Brodie & others



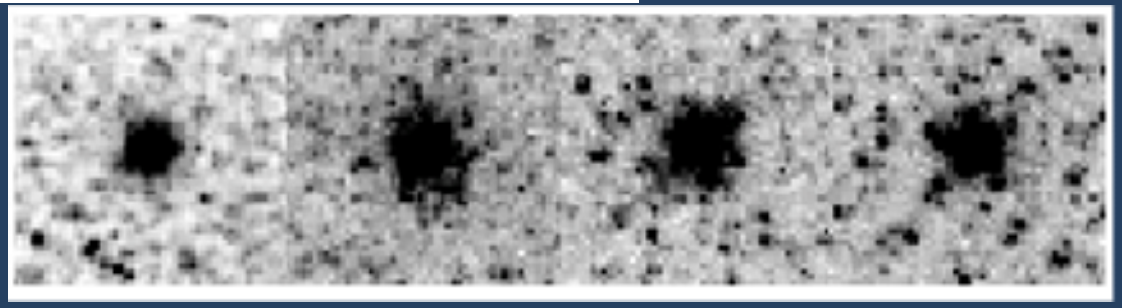
Huchra & Brodie (87): some of the first spectroscopy of globulars outside the LG

KINEMATICS OF THE M31 GLOBULAR CLUSTER SYSTEM[1]

J. P. HUCHRA
Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge, MA, 02138

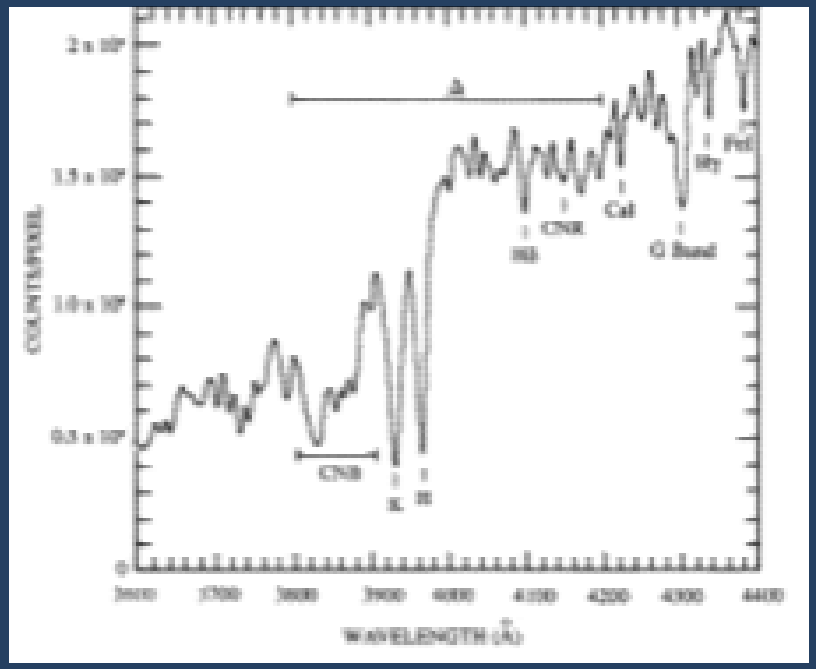
"The M31 globular cluster system is like the Milky Way system only more so."

Huchra 93

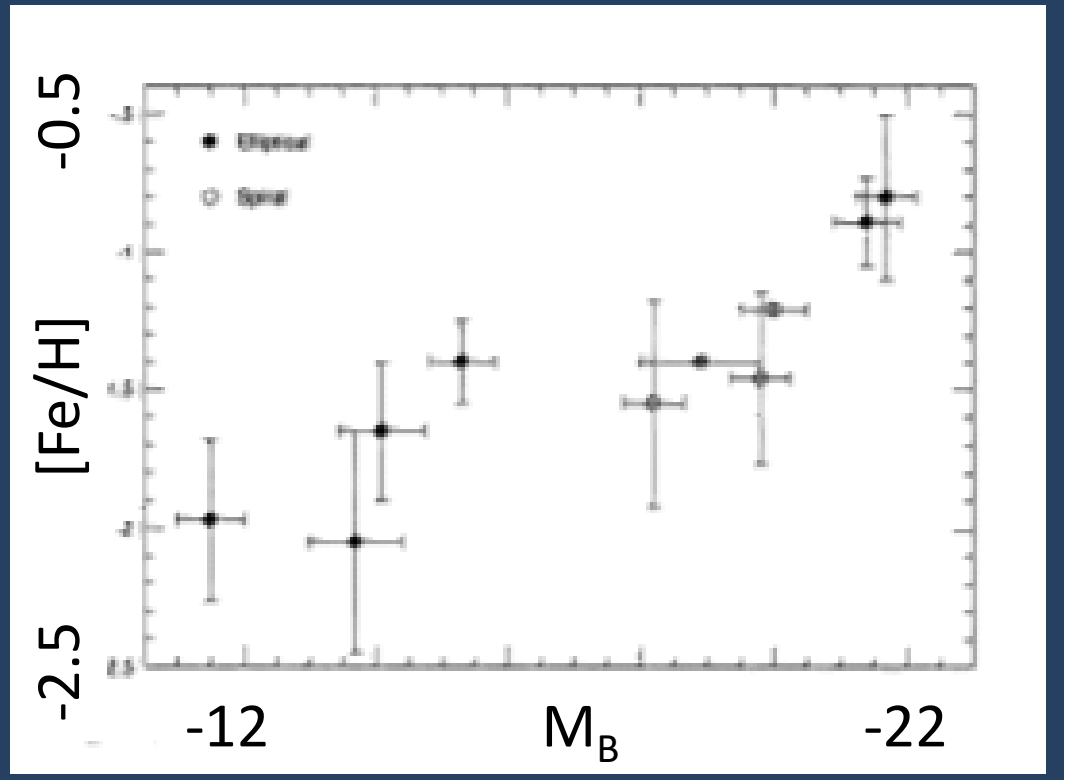


Barmby & Huchra 01

Brodie & Huchra calibrated GC spectroscopic metallicity & found that mean GCS metallicity correlates with galaxy luminosity



Brodie & Huchra 90



Brodie & Huchra 91

Early papers with Jean Brodie have some classic Huchra-isms

ment and a 'point' measurement, a conservative estimate of the uncertainty in our mass estimate due to ignorance of the mean cluster orbital eccentricities is a factor of 2.

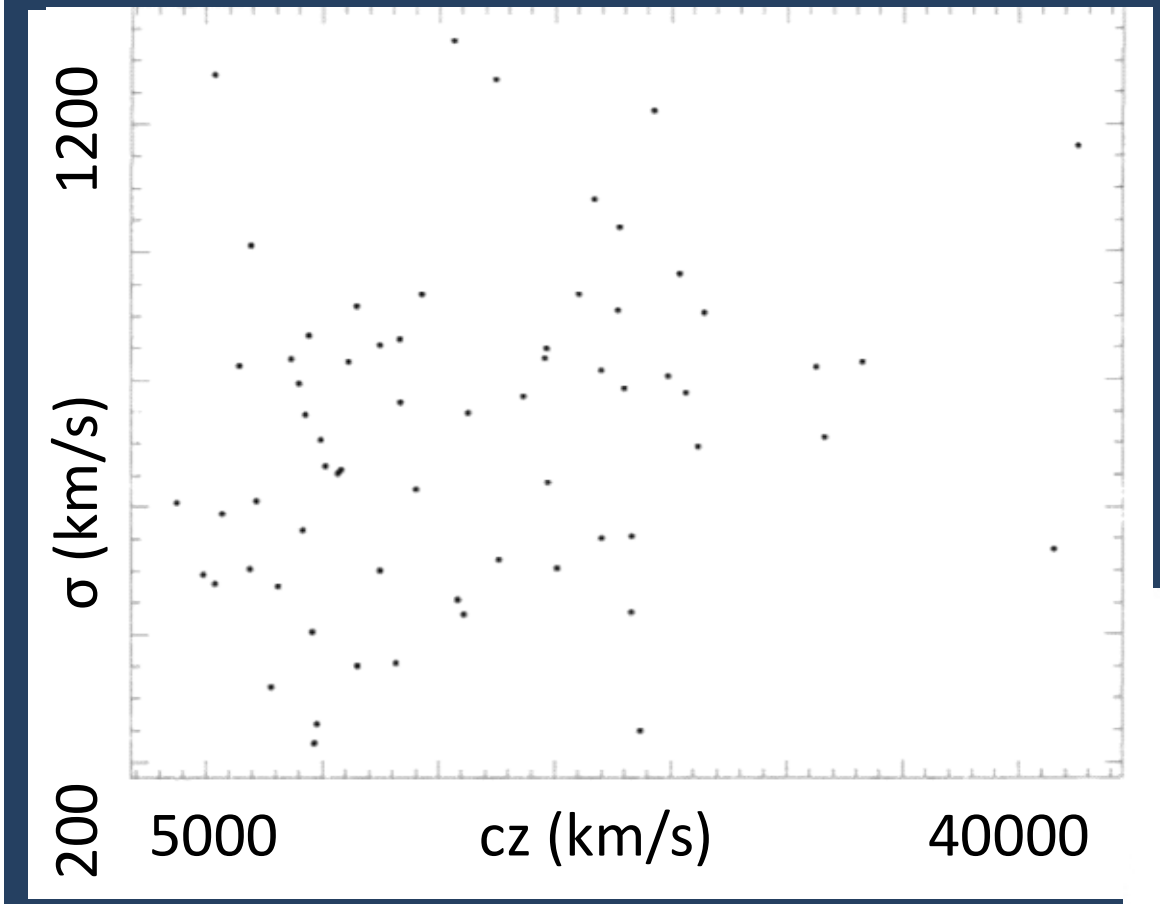
By definition, we suggest increasing both the sample size and radial range of measured clusters to derive a proper projected dispersion profile for the cluster system.

Huchra & Brodie 87

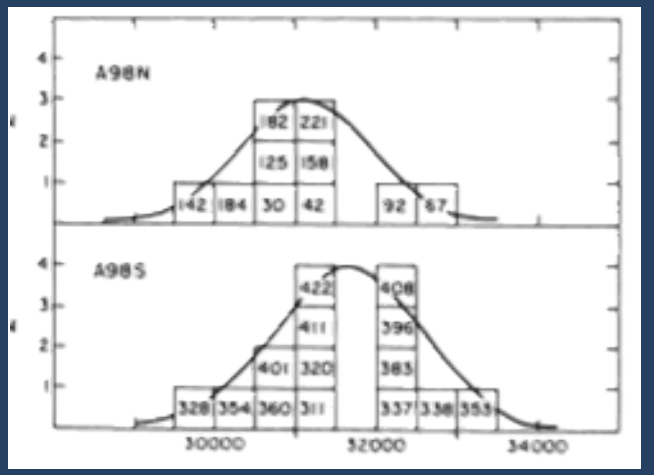
with getting the spectrograph put back together for the beginning of our run. We thank Ethan Schreier and Ginevra Trinchieri for useful discussions. We would also like to thank the time allocation committee for giving us time in January to observe M87 because the February, March, and April dark runs were all clouded out.

Huchra & Brodie 84

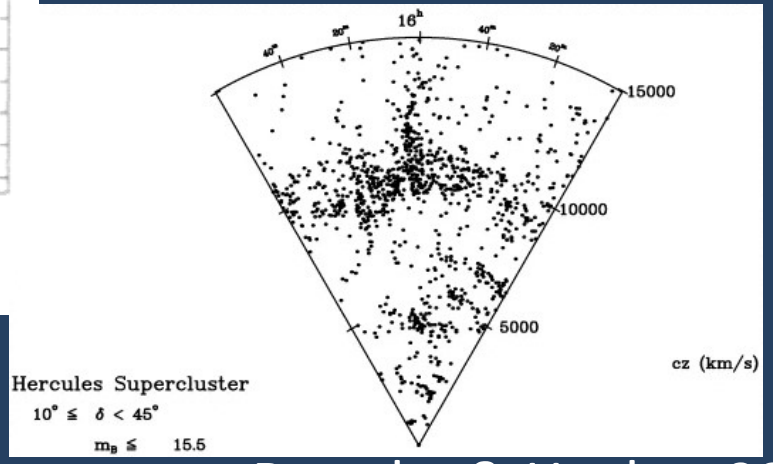
John also worked on galaxy groups, clusters and superclusters



Zabludoff, Huchra & Geller 90

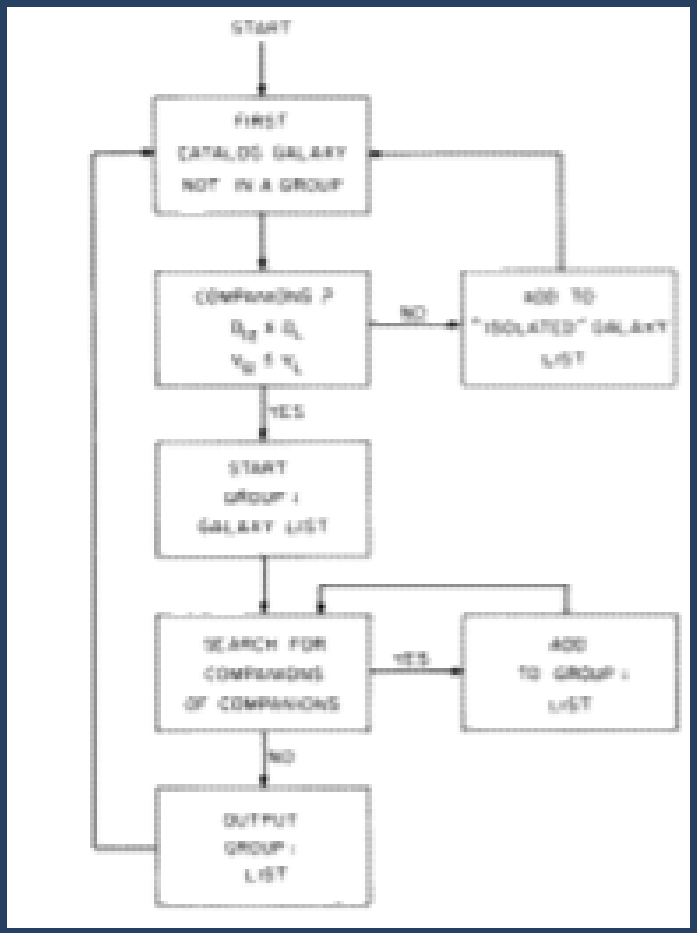


Beers, Huchra & Geller 82

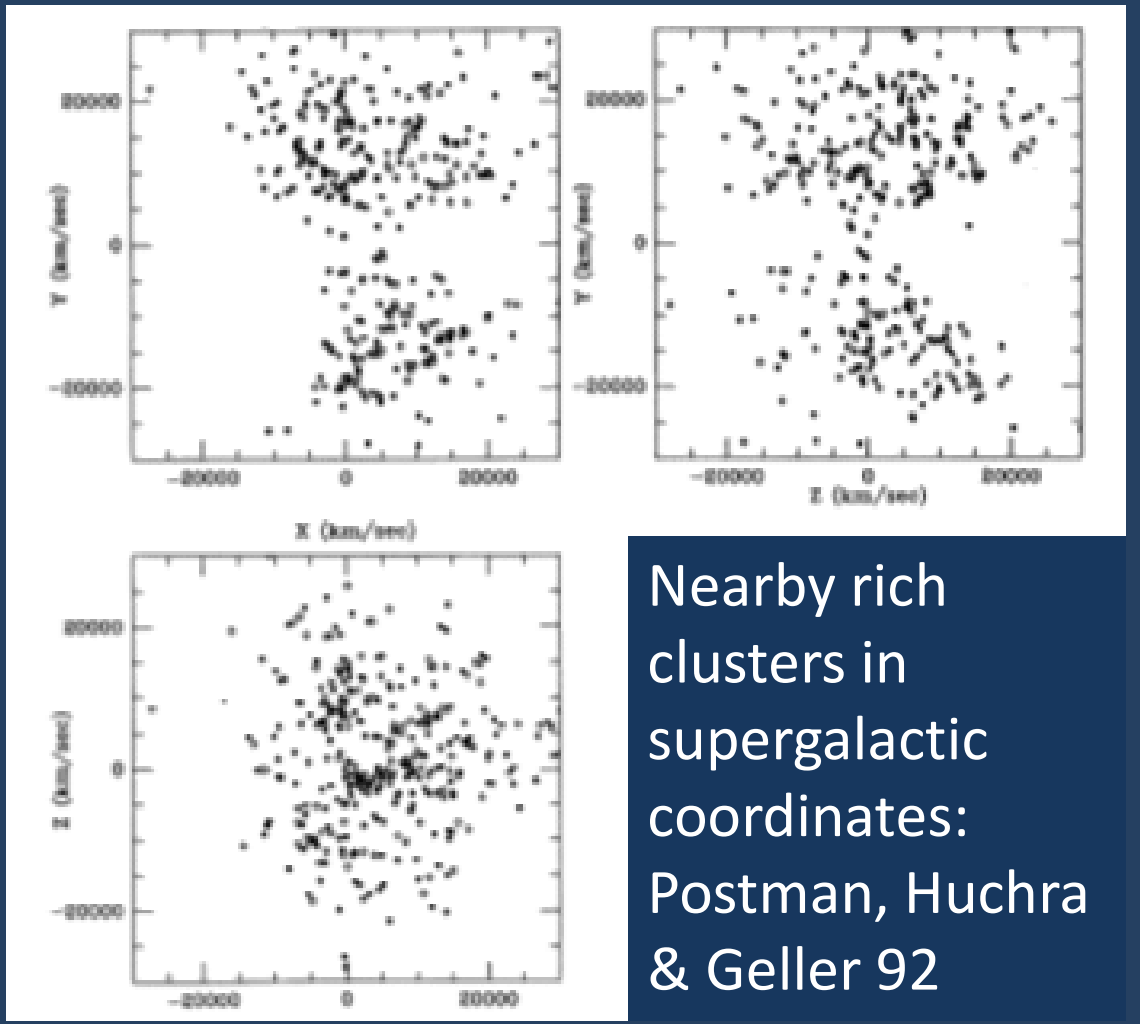


Barmby & Huchra 98

Significant work included the “friends of friends” algorithm and the distribution of nearby rich clusters

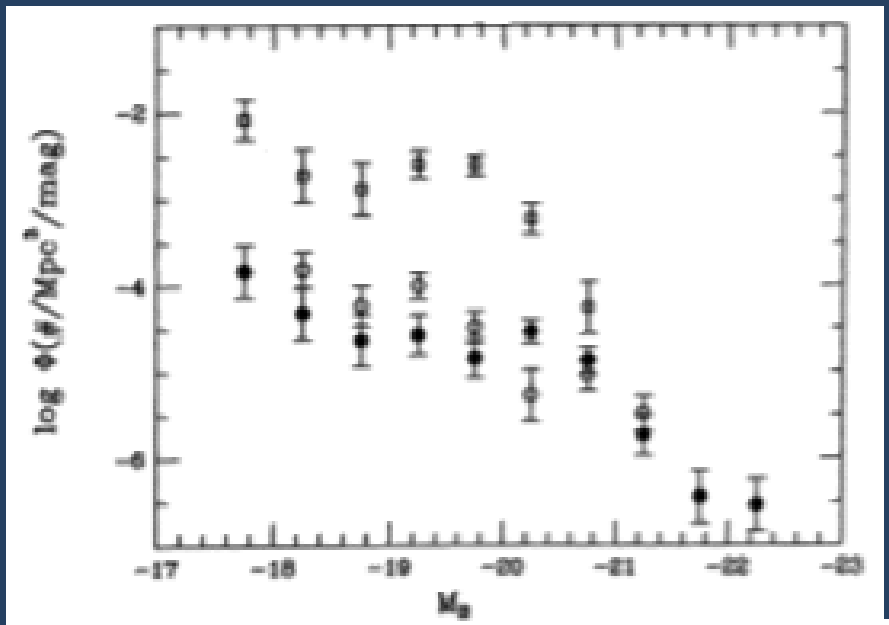


Huchra & Geller 82

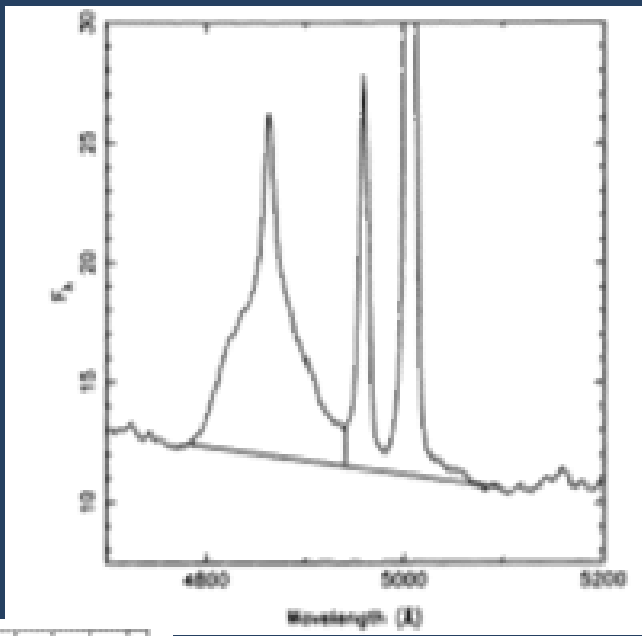


Nearby rich clusters in supergalactic coordinates: Postman, Huchra & Geller 92

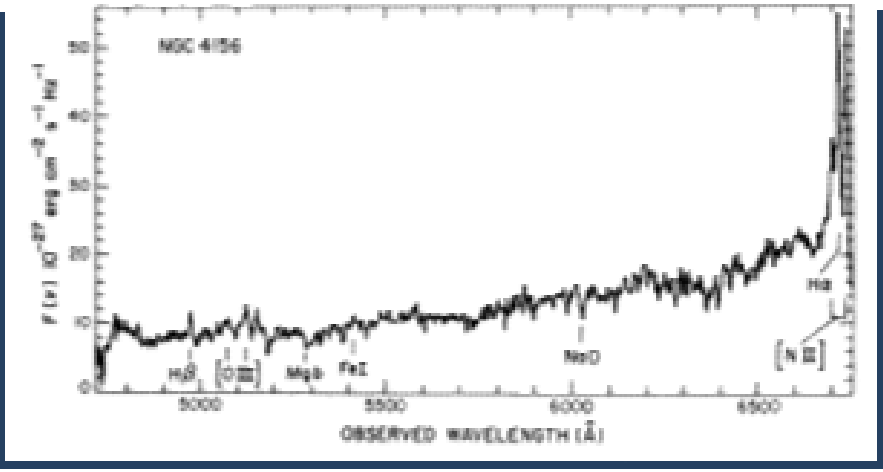
John catalogued Seyfert galaxies, anchored reverberation mapping, and took the first spectrum of an “optically dull” AGN



Huchra & Burg 92



Peterson et al. 91



Elvis et al. 81

His “From Stars to Galaxies” conference summary (1996) has some funnies

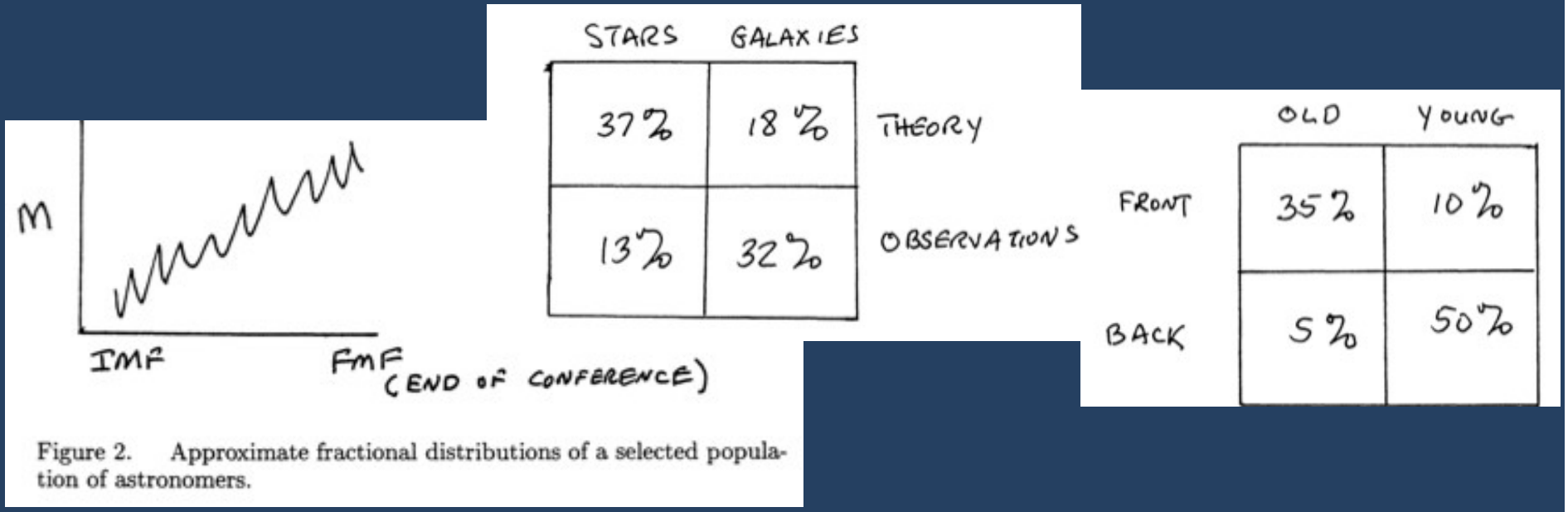


Figure 2. Approximate fractional distributions of a selected population of astronomers.

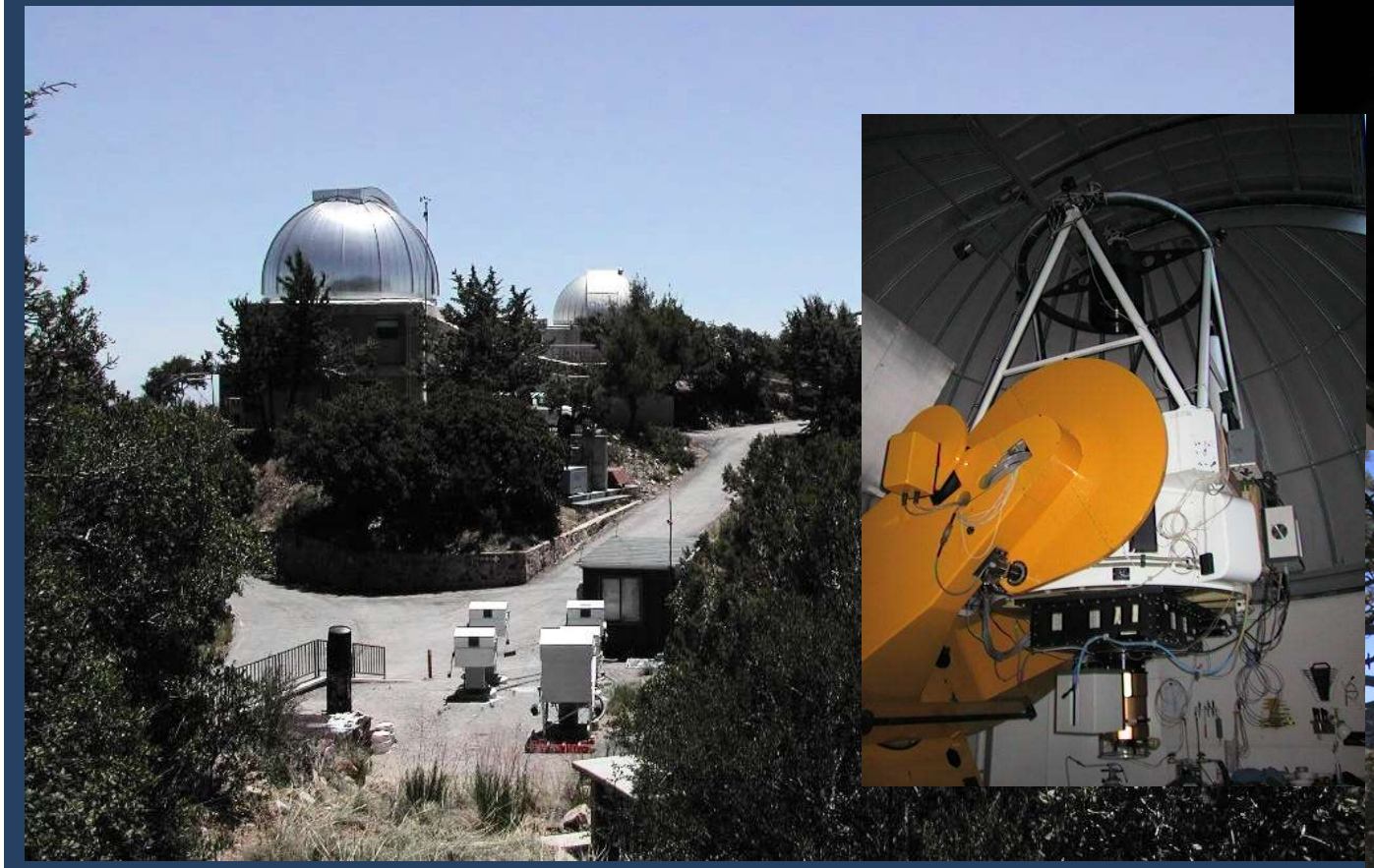
I would like to end with some more personal observations of this workshop. In particular, during the meeting, I was able to find the time to do a small piece of research, both observational and theoretical, on population synthesis. The observations were made over a 5 day period using a matched pair of 1-cm optical collectors carried in a binocular frame. The data were reduced via microwave link on a Sparc 5 loaded with the latest ApJ, A&Aand AJ, as well as the complete works of Freud and Jung (to enable analysis of both normal and abnormal systems).

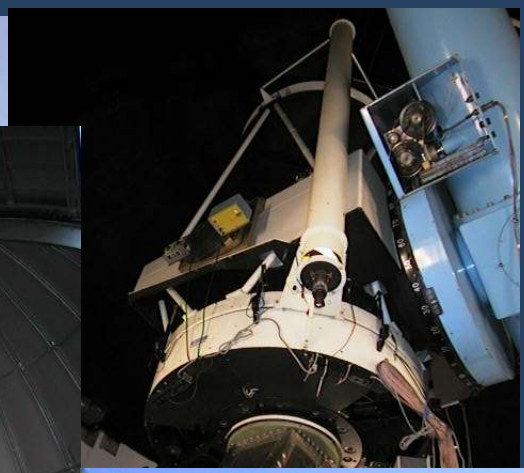
And some more serious wisdom

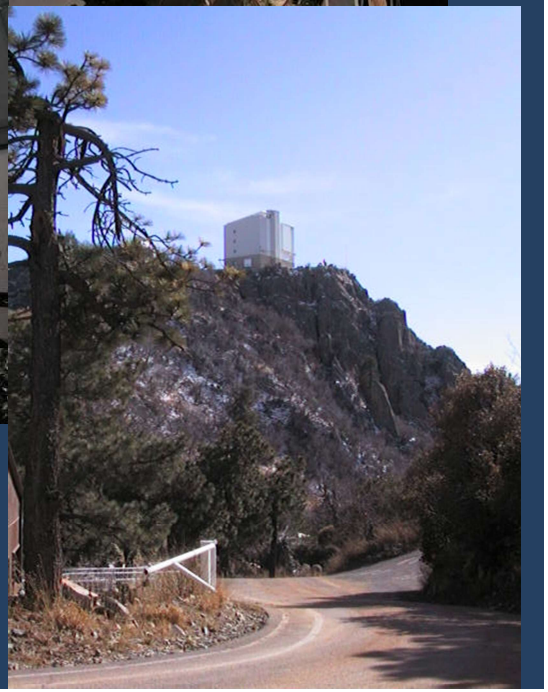
1. “Be careful about forests and trees!
2. Remember the main goal is to learn about cosmology..
3. ..Then the secondary goal is to understand individual objects.
4. Use the right tools!
5. Beware statistics…nothing is ever normally distributed.
6. Beware selection effects!”

Huchra, J., 1996 in From Stars to Galaxies, ASP Conf Ser 98, 597

“You can observe a lot just by watching”
– Yogi Berra or John Huchra?







Of course he knew the difference between physics & stamp collecting

Thanks to

J. Brodie, M.Elvis, E. Henneken, J. Landstreet, M. Postman

And of course John!

S. Courteau