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# This is a Long Title For This Sample Article

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## ABSTRACT

This is a short statement which describes the research that I did for this paper. I have been very careful not to include any mathematics or references in this abstract, and made sure that it is clearly worded and free of extraneous jargon. The research I did was important, and I want people ho read the abstract to get a sense of why it is important. I found writing this abstract to be fun and informational.

## 1 INTRODUCTION

A focal problem today in the dynamics of globular clusters is core collapse. It has been predicted by theory for decades (Hènon, 1961; Lynden-Bell & Wood, 1968; Spitzer, 1985), but observation has been less alert to the phenomenon. For many years the central brightness peak in M15 (King, 1975; Newell & O'Neil, 1978) seemed a unique anomaly. Then Aurière (1982) suggested a central peak in NGC 6397, and a limited photographic survey of ours (Djorgovski & King, 1984, Paper I) found three more cases, NGC 6624, NGC 7078, and Terzan 8), whose sharp center had often been remarked on (Canizares et al., 1978).

As an example of how the new AASTeX object tagging macros work, we will cite some of the "Superlative" objects mentioned in section 10 of Trimble's (1992) review of astrophysics in the year 1991. The youngest star yet found was IRAS 4 in NGC 1333. 70 Oph was found to be the longest period spectroscopic binary. The most massive white dwarf was GD 50, estimated at 1.2 solar masses. The first neutral hydrogen found in a globular cluster was NGC 2808 while the I Zw 18 retained the record for metal deficiency. However, another low metallicitity galaxy was UGC 4483 in the M 83 group. The largest redshift source in 1991 was found at z=4.897. Lastly, what paper would be complete without a mention of the Crab nebula!

## 2 OBSERVATIONS

All our observations were short direct exposures with CCD's. We also have a random *Chandra* data set ADS/Sa.ASCA#X/86008020 and a neat HST FOS spectrum that readers can access via the links in the electronic edition. Unfortunately this has nothing whatsoever to do with this research. At Lick Observatory we used a TI 500×500 chip and a GEC 575×385, on the 1-m Nickel reflector. The only filter available at Lick was red. At CTIO we used a GEC 575×385, with $B, V$, and $R$ filters, and an RCA 512×320, with $U, B, V, R$, and $I$ filters, on the 1.5-m reflector. In the CTIO observations we tried to concentrate on the shortest practicable wavelengths; but faintness, reddening, and poor short-wavelength sensitivity often kept us from observing in $U$ or even in $B$. All four cameras had scales of the order of 0.4 arcsec/pixel, and our field sizes were around 3 arcmin.

The CCD images are unfortunately not always suitable, for very poor clusters or for clusters with large cores. Since the latter are easily studied by other means, we augmented our own CCD profiles by collecting from the literature a number of star-count profiles (King et al., 1968; Peterson, 1976; Harris & van den Bergh, 1984; Ortolani et al., 1985), as well as photoelectric profiles (King, 1966, 1975) and electronographic profiles (Kron et al., 1984). In a few cases we judged normality by eye estimates on one of the Sky Surveys.

## 3 HELICITY AMPLITUDES

It has been realized that helicity amplitudes provide a convenient means for Feynman diagram[1] evaluations. These amplitude-level techniques are particularly convenient for calculations involving many Feynman diagrams, where the usual trace techniques for the amplitude squared becomes unwieldy. Our calculations use the helicity techniques developed by other authors (Hagiwara & Zeppenfeld, 1986); we briefly summarize below.

### Formalism

A tree-level amplitude in $e^+e^-$ collisions can be expressed in terms of fermion strings of the form

$$\bar{v}(p_2,\sigma_2)P_{-\tau}\hat{a}_1\hat{a}_2\cdots\hat{a}_n u(p_1,\sigma_1), \tag{1}$$

where $p$ and $\sigma$ label the initial $e^{\pm}$ four-momenta and helicities ($\sigma = \pm 1$), $\hat{a}_i = a_i^{\mu}\gamma_\nu$ and $P_\tau = \frac{1}{2}(1+\tau\gamma_5)$ is a chirality projection operator ($\tau = \pm 1$). The $a_i^\mu$ may be formed from particle four-momenta, gauge-boson polarization vectors or fermion strings with an uncontracted Lorentz index associated with final-state fermions.

In the chiral representation the $\gamma$ matrices are expressed in terms of $2 \times 2$ Pauli matrices $\sigma$ and the unit matrix 1 as

$$\begin{aligned}\gamma^\mu &= \begin{pmatrix} 0 & \sigma_+^\mu \\ \sigma_-^\mu & 0 \end{pmatrix}, \gamma^5 = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \\ \sigma_\pm^\mu &= (\mathbf{1}, \pm\sigma),\end{aligned}$$

giving

$$\hat{a} = \begin{pmatrix} 0 & (\hat{a})_+ \\ (\hat{a})_- & 0 \end{pmatrix}, (\hat{a})_\pm = a_\mu \sigma_\pm^\mu, \tag{2}$$

The spinors are expressed in terms of two-component Weyl spinors as

$$u = \begin{pmatrix} (u)_- \\ (u)_+ \end{pmatrix}, v = ((v)_+^\dagger, (v)_-^\dagger). \tag{3}$$

[1] Footnotes can be inserted like this.

**Table 1.** This is a caption

| Star | Height | $d_x$ | $d_y$ | $n$ | $\chi^2$ | $R_{maj}$ | $R_{min}$ | $P$ | $PR_{maj}$ | $PR_{min}$ | $\Theta$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33472.5 | -0.1 | 0.4 | 53 | 27.4 | 2.065 | 1.940 | 3.900 | 68.3 | 116.2 | -27.639 |
| 2 | 27802.4 | -0.3 | -0.2 | 60 | 3.7 | 1.628[a] | 1.510 | 2.156 | 6.8 | 7.5 | -26.764 |
| 3 | 29210.6[b] | 0.9 | 0.3 | 60 | 3.4 | 1.622 | 1.551 | 2.159 | 6.7 | 7.3 | -40.272 |
| 4 | 32733.8 | -1.2 | -0.5 | 41 | 54.8 | 2.282 | 2.156 | 4.313 | 117.4 | 78.2 | -35.847 |
| 5 | 9607.4 | -0.4 | -0.4 | 60 | 1.4 | 1.669 | 1.574 | 2.343 | 8.0 | 8.9 | -33.417 |
| 6 | 31638.6 | 1.6 | 0.1 | 39 | 315.2 | 3.433 | 3.075 | 7.488 | 92.1 | 25.3 | -12.052 |

[a] This is a footnote

[b] This is another note

The Weyl spinors are given in terms of helicity eigenstates $\chi_\lambda(p)$ with $\lambda = \pm 1$ by

$$u(p,\lambda)_\pm = (E \pm \lambda|\mathbf{p}|)^{1/2}\chi_\lambda(p), \quad (4a)$$

$$v(p,\lambda)_\pm = \pm\lambda(E \mp \lambda|\mathbf{p}|)^{1/2}\chi_{-\lambda}(p) \quad (4b)$$

## 4 FLOATING MATERIAL AND SO FORTH

Consider a task that computes profile parameters for a modified Lorentzian of the form

$$I = \frac{1}{1 + d_1^{P(1+d_2)}} \quad (5)$$

where

$$d_1 = \sqrt{\left( \frac{x_1}{R_{maj}} \right)^2 + \left( \frac{y_1}{R_{min}} \right)^2}$$

$$x_1 = (x - x_0)\cos\Theta + (y - y_0)\sin\Theta$$

$$y_1 = -(x - x_0)\sin\Theta + (y - y_0)\cos\Theta$$

In these expressions $x_0$,$y_0$ is the star center, and $\Theta$ is the angle with the $x$ axis. Results of this task are shown in table 1. It is not clear how these sorts of analyses may affect determination of $M_0$, but the assumption is that the alternate results should be less than 9 out of phase with previous values.

We are grateful to V. Barger, T. Han, and R. J. N. Phillips for doing the math in section 3. We are also grateful to the American Astronomical Society for the text and comments which were adapted in this sample file.

## APPENDIX A SOME MORE INFORMATION

This is an example of an appendix section. You can put any supplementary material here and it will be in a special section marked with letters instead of numbers.

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