



# News from The Society for Astronomical Sciences

Vol. 7, Number 2

## AMATEUR AND PROFESSIONAL ASTRONOMERS PRESENT SMALL- TELESCOPE RESEARCH RESULTS AT 28TH ANNUAL "SYMPOSIUM ON TELESCOPE SCIENCE"

*Editorial: Since the Newsletter editor (Dale Mais) could not attend this years SAS Symposium, Bob Buchheim provided the following synopsis of the joint SAS-AAVSO meeting . Many thanks to Bob for putting this together.*



The 2009 Symposium of the Society for Astronomical Sciences (SAS) set a new standard for quality of presentations, diversity of research topics, and attendance. The Symposium had 167 registrants and was held as a joint meeting of the SAS and the American Association of Variable Star Observers (AAVSO). The worldwide zeal for amateur astronomical research and small-telescope science was evident, with participants from England, New Zealand, Canada, Argentina, and France, as well as from across the US. Because the program included both SAS and AAVSO activities, it was a very busy schedule: two and a half days of technical papers, two evening workshops, the AAVSO membership meeting, a group dinner and a special speech by Dr. John Percy were packed into three days. I think that everyone was fascinated and exhausted by the conclusion of the event!

The breaks between technical presentations were buzzing with informal discussions as old friends chatted, new acquaintances shared ideas and results,

and doubtless more than a few collaborations were spawned. Off-the-agenda gatherings included a handful of participants involved with the Sentinel Meteor camera system, and about a dozen people interested in the Center for Backyard Astrophysics.

Two features of the SAS conferences that are becoming increasingly important are the poster papers, and the sponsor's displays. Poster papers provide an opportunity for participants to report on projects and results that could not be fit into the technical session presentations. Each poster-author was given a few minutes of "podium time" to describe the project. This turned out to be a popular

approach, and will probably be expanded for future SAS Symposia.

Sponsors included Apogee Instruments, Santa Barbara Instruments

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### Commi ttee:

- Lee Snyder – Co-Chairman
- Robert Stephens – Co-Chairman
- Robert Gill – Audio Visual Webmaster
- Dave Kenyon – Program Co-Chairman
- Dale Mais – Program Co-Chairman, Newsletter editor
- Brian Warner– Program Co-Chairman
- Jerry Foote–Program Co-Chairman

### Advisors:

- Arne Henden
- Dirk Terrell
- Alan Harris



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Utica Avenue, Suite 105, Rancho Cucamonga, CA 91730. You may also join online at the registration page of the web site. Membership dues are tax deductible.

We currently have 82 members with many renewals due in by June 1.

The SAS is a 501(c)(3) charitable organization.

### *Your Participation Wanted!*

As I have mentioned in previous Newsletters, we need your participation in the Newsletter. We don't want this to become a one person or just a couple person show. If you have an article which can cover a variety of topics, please put it together for a future Newsletter. Work in progress is always welcome. In addition, we have started a "letters to the Editor" section where we would like to add 2-3 letters from the members/participants. We had no letters to incorporate into this Newsletter edition. Constructive comments are always welcome as we are always looking for ways to improve not only the quality of the Newsletter but also the quality of the Symposium. We want the SAS to become a year around organization not just a once a year group.

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Group, Sky Publishing Corporation, Software Bisque, and PlaneWave Instruments. The vendors displaying their products were AstroDon, DC-3 Dreams, Quantum Scientific, Optec, Ceravolo Optical Systems, Fishcamp Engineering and Shelyak Instruments. The hardware-manufacturer sponsors had impressive displays of new products set up for participants to drool over: optical tube assemblies from PlaneWave and Ceravolo, CCD imagers from Apogee, Quantum Scientific and Fishcamp, a new affordably-priced set of Sloan g-r-i-z photometric filters from AstroDon, a variety of innovative opto-mechanical accessories from Optec and a new fiber-fed spectrograph from Shelyak.

The technical session papers covered a diverse range of amateur research and professional-amateur collaborations. Attendees and SAS members received a DVD with the full proceedings. For non-members, the proceedings will be available on the SAS website (but of course, if you don't attend the Symposium, you miss out on the valuable personal interactions with the presenters and attendees). What follow below are my personal impressions of the talks, working from planet Earth outward into the distant universe.

Here on Earth, we have many clever people working up new hardware and software solutions to the problem of gathering, analyzing, and interpreting astronomical information. We learned from Arne Henden about the AAVSO's planned all-sky photometric survey, which promises to be a great boon to asteroid and variable-star photomet-

### Membership Information

*Membership in your new Society for Astronomical Sciences (SAS).*

As was pointed out with the last issue, it was felt that a modest membership fee would greatly help SAS to produce a better product for its members. This fee will be \$25.00 per year. What will this membership fee provide? Well for one thing it WILL NOT go to any committee members as part of their efforts within SAS. We volunteer our time for The Society.

Members will receive a discount for the registration fee each year for the Symposium at Big Bear. It will assure you that you will get a copy of the published proceedings each year, even if you do not attend the Symposium. It will help defray costs in bringing in outside speakers (professionals) to the symposium.

Membership is annual and runs from July to June of the following year. To become a member, send \$25 to: Society for Astronomical Sciences, 8300



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for Astronomical  
Sciences*

Group photo at this years  
SAS Symposium



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rists by providing an all-sky, dense network of calibrated photometry for stars between about 10<sup>th</sup>-17<sup>th</sup> magnitude. Tom Krajci gave a spirited explanation of ways to “tune up” your schmidt-cassegrain telescope for improved optical and mechanical performance. Russ Genet gave us an update on his initiative to develop low-cost, lightweight meter-class telescope technology. Meteor observations with the Sentinel camera system will be improved by the techniques that were described by Wayne Watson. At the “bargain” end of the equipment spectrum, Paul Temple described his (successful) efforts to use a webcam for differential photometry. Moving outward along the “higher cost and sophistication” direction of the spectrum, Olivier Thizy presented some examples of the remarkable resolution and precision that is now achievable in amateur spectroscopy with his new “e-Shel” fiber-optic-fed spectrograph.

Amateur astronomers are making important contributions to the research agenda related to asteroids. John Menke described the importance of asteroid occultation observations (they are the least-expensive way to determine the size and shape of an asteroid), and several methods for recoding occultation observations. One of the most effective methods of measuring an asteroid occultation is to position an array of observing stations across the occultation path. Scotty Degenhardt has taken this concept to a whole new level with his “mighty mini” portable video recording system. The low-cost “mighty mini” appears to offer a revolutionary advance in the quantity and quality of asteroid occultation data, since it is now practical for one person to record several occultation tracks with modest cost and effort.

Gathering asteroid lightcurves has been an important discipline for at least 50 years. Once it was the sole responsibility of professional planetary scientists, but over the last couple of decades this

field has benefited greatly from the huge quantity of high-quality amateur data that is now being gathered and published. Dr. James Young gave us a wonderful historical perspective on the “old days” of dry-ice cooled photometers and hand-recorded readings. Imagine the tired eyeballs and stiff fingers after a 9-hour night in which he climbed up and down the ladder (to reach the eyepiece) for each of 1200 photometric readings on 12 asteroids! We CCD photometrists have it easy, by comparison.

Amateur projects to study asteroids continue to advance in quality and sophistication. Gary Vander Haagen described the great value of making extended observations of asteroids as they approach near-zero phase angles, to determine the fundamental parameters H (absolute magnitude) and G (“slope parameter”). This is now well within the capability of experienced asteroid lightcurve photometrists. Another challenge for amateurs is to fill in the observation-bias against slowly rotating asteroids: it takes some dedication to continue a project when night after night fails to display a pretty lightcurve. Brian Warner explained the importance of understanding the distribution of slowly-rotating asteroids, and the physics that causes them to slow down. Finally, Bob Stephens and Ralph Megna presented the first results from their new project, attempting to use small-telescope spectroscopy to determine the taxonomic class of asteroids. The initial results are heartening, in that their results have replicated published professional spectral classification of several main-belt asteroids.



Solar system studies were rounded out by a tour-de-force analysis of the lightcurve of comet Holmes, presented by Dr. Richard Miles. Comet photometry is complex, because the comet (unlike an asteroid) is an extended object on the CCD image and its rotation period is likely to be very long. Richard’s analysis had to account for the comet’s changing distance, changing physical size of the coma, and rapid apparent motion across the sky in order to find evidence of a rotation period and some new ideas about the cause of outbursts such as the one exhibited by comet Holmes in its 2008-09 apparition.

Turning our attention beyond the solar system and out into the Milky Way, we were treated to several wonderful presentations about variable stars. Kate Hutton described the AAVSO’s long-period variable star section activities. An important feature of LPV studies is the ongoing value of visual observations – “eyeballs to the eyepiece” – to correlate the historical record to newer instrumentation, and to maintain surveillance on stars that are too bright for modern instruments and surveys. Donald Collins explained how he used a digital SLR camera (with its standard commercial lens) to follow the variability of beta-Lyrae. This technique may be promising for studies of many bright variable stars. Jerry Horne presented his four-color (BVRI) observations of three variable stars in Lyra, that demonstrated the fun and useful observations that can be made with

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modest equipment and above-average dedication to scientific data-gathering.

This was a big year for eclipsing binary star systems. Lee Snyder described his observations and a model of the contact binary BL Eridanus. The components of this system are so close together, and the mass transfer is so dramatic, that changes in the orbital parameters can be detected in time spans of only 10-20 years. Nicolas Wilsey presented his study (with Prof. Matthew Beaky) of the O'Connell Effect: why are the two maxima of some eclipsing binaries' lightcurves not of equal brightness, as geometry and logic says they should be? It might be star spots, it might be accretion disks, or it might be something not-yet-understood. Stay tuned.

David Boyd described the intensive world-wide campaign to keep DW Ursae Majoris under nearly-continuous photometric observation for a full month. This was a wonderful example of professional-amateur collaboration, which defined many of the parameters of this complex interacting binary system.

Dr. Robert Stencel and Jeff Hopkins gave a very complete explanation of the value and status of the epsilon Aurigae observing campaign. The goal is to gather all possible information about this enigmatic object, including time-sequence photometry across all wavelengths and spectral data (especially H-alpha variations) during its 2009-2010 eclipse. Since the period is 27 years, this may be the "last chance in our lifetimes" opportunity for many of us to contribute to the study of this star. (Now, that's a depressing thought, isn't it?) It was very interesting to see that amateur equipment (small scopes and a commercial spectrograph) can observe changes in the H-alpha line of the star as the eclipse begins.

John Pye described the project that his students conducted using the AAVSO's remote telescope at Sonoita Research Observatory, to follow the



eclipse lightcurve of EE Cephei. This was a nice counterpoint to the presentations about epsilon Aurigae, because EE Cephei displays some features in its lightcurve that are reminiscent of epsilon Aurigae, but with a 5.6 year period it allows more frequent eclipse observations. Bob Buchheim presented his project to determine the first complete lightcurve of eclipsing system UZ Sagittae, and model the system using its two-color (V, R) lightcurve.

Finally, the two "farthest out" presentations stretched the boundaries of amateur research (albeit in different directions). The scientific "stretch" was

provided by Thomas Kaye's status report on the "Spectrashift" project goal to be the first all-amateur collaboration to discover an exo-planet using transit observations. No discoveries yet, but they have identified an unexploited parameter space (fainter stars than professional radial-velocity surveys can reach), and demonstrated the necessary accuracy and data-reduction pipeline. The "conceptual" stretch was offered by James Edwards, who described an optical SETI campaign that would be based on quite reasonable technology (we do the receiving, and

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“they” do the transmitting), and which uses the observable lightcurve signature of exo-planet transits as a sort of “time sync” to trigger the signals.

In addition to the technical session papers, participants had the opportunity to attend workshops on “Data Mining” (by Dr. Arne Henden and Dr. Paula Szkody), and “Photometry Essentials” (by Jerry Foote and Brian Warner) – valuable preparatory classes that were designed to enable the energetic amateur astronomer to begin effective research projects.

Pamela Gay’s presentation on “Filling up your astronomy program” was a wonderful overview of the many resources that AAVSO can offer to both individual observers and to local astronomy clubs (including a Speaker’s Bureau and a Presentation Library).

The close relationship between SAS and AAVSO was on display all week. A sizable fraction of the participants were members of both organizations, and the presence of the AAVSO Board increased the very valuable participation of professional astronomers as critics and advisors for the amateur researchers. It was a particular pleasure to meet and speak with Dr. Arlo Landolt (the creator of the Landolt Standard fields). Without his dedicated and meticulous work in creating these fields, the reduction of our observations to a standard system would be enormously difficult. He indicated that he is working on a new set of fields that will be at higher declination and it should be ready in about two years.

The Symposium was wrapped up by a wonderful after-dinner talk on “Galileo’s Legacy” by Dr. John Percy; and the traditional drawing for door prizes.

As always, the SAS Symposium was an educational, inspirational and motivational event for all of the participants, and I’m sure that most of us went home all fired up with plans for the projects that we’ll accomplish in the coming year. For the scientifically-inclined amateur astronomer, this is certainly the premier conference of the year – it is a unique



opportunity to see what amateur scientists are capable of doing, and to receive valuable insights and critiques from professional astronomers. It doesn’t get much better than this!

The next SAS Symposium on Telescope Science is tentatively scheduled for May 11 -13, 2010, at the Northwoods Inn in Big Bear, California. These dates continue the tradition of holding the SAS Symposium during the week before the RTMC Astronomy Expo, which is also held in Big Bear. Check in with the SAS website at [SocAstroSci.org](http://www.SocAstroSci.org) for periodic updates and news about the SAS.

About the SAS: The Society for Astronomical Sciences facilitates collaborative astronomical research between amateur, student, and professional astronomers. SAS workshops provide amateur and student astronomers with solid grounding in observational procedures and data-reduction methods. The annual “Symposium on Telescope Science” is the premier forum for presentation of the results of small-telescope research and professional-amateur astronomical collaborations. For more information, see: <http://www.SocastroSci.org>



Brian is caught.....with a diffraction grating after seeing the light (left, middle picture)

### Introduction:

By "Personal Astronomical Software" I mean a software application that allows you to easily develop a program to manage your astronomical data. Sound good? Well there is such an application and it's called FileMaker Pro. It allows you to easily create databases that can hold your data, manipulate them, do complex computations and perform multiple tasks with the click of a button that calls a script that does exactly the things you want done.

### BASIC Programming:

In the beginning, most personal computers came with BASIC, an easy to use programming language. While BASIC programs were easy to develop, they quickly became unmanageable. It was easy to create horrible programs and even situations that would crash the computer. In addition, the programming and programs were strictly line entry. With FileMaker Pro, most of the work is done for you and much of the development is just point and click. The application also tends to prevent you from doing bad things. The Graphical User Interface makes design, development and use a joy.

### Spreadsheets:

Many people use a spreadsheet program like Excel to handle and reduce data. While this will work for single observations, it's terrible inefficient when multiple observations are involved. Using a database is a much better way. Spreadsheets work best when you have just one set of data to work with. When you have hundreds or thousands of observations, you are required to have hundreds or thousands of files, one for each observation.

### Databases

With a database, each observation becomes a record. Each piece of data becomes a data field within the record, e.g., star name, RA, Dec, Date, Time, counts, magnitude and even images and sounds. Within a record all the entered data is stored. All the computations and manipulations done with a spreadsheet can be done in the record. Databases can easily handle billions of records. In addition, you can find specific records, sort the records, develop lists and reports with specific data fields and records, view, print and export the data lists and reports.

### FileMaker Pro



While there are several database applications (e.g., Access, 4D, SQL), but by far FileMaker Pro is the most user-friendly program. FileMaker Pro allows you to easily design programs tailor fit to your needs and desires.

### FileMaker Pro Versions

As of July 2009 the current version of FileMaker Pro is version 10. With versions of FileMaker Pro 6 and earlier different types of data (e.g., Star Data, Observatory Data, Observation Data) would be set up in different files. The set of files would constitute the developed program. With FileMaker 7 and newer, this can still be done, but the more common database technique of using tables all within one file instead of the multiple file program can be used and works better. You end up with just one file for all the tables and records.

### FileMaker Pro Modes:

There are four modes in FileMaker Pro, Browse, Find, Layout and Preview.

#### Layout Mode

The Layout mode is where you design the database. You can create multiple layouts. These are like templates that will be the same for each record. You have complete control on how the final layout will look. Each table/file can have a set of layouts. Layouts are where the data fields go. Data fields are defined for each table/file and will be common for all the layouts within a table/file. You can use whichever data fields you want on a layout.

#### Browse Mode

Once you design it, the Browse mode is where most of the work will be done. Here is where you "use" what you created. You enter data, calculations are performed, results viewed, lists created, sorted, exported and printed.

#### Find Mode

Find mode is like Browse except all data fields are blank so you can enter find criteria. This allows you to find a set of records that can then be sorted, viewed, printed or exported.

#### Preview Mode

Preview mode shows what the printout will look like.

#### Buttons and Scripts

Buttons and scripts are very powerful features and a lot of fun to use. A script is a set of instructions. These instructions are mostly point and click so you cannot get into too much trouble. A script can be assigned to a button. A button when clicked on will call the script. You can make anything on the layout a button. You can draw a picture of a button or use an image and just define it as a button that calls the script. You can have multiple buttons and scripts.

### Relationships

This is an area that tends to scare many people. It really is simple and a very powerful feature. For example you can have a Star Data table/file. Each star record has a unique Star ID. In any other table/file you can use that Star ID via a relationship to “lookup” and automatically enter all the star information in the current table/file that exists in the Star Data file. This means you do not need to reenter the star information. This can save a great deal of work.

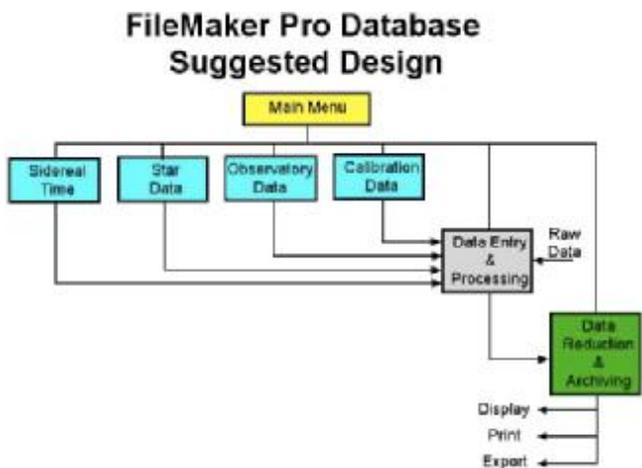
### Portals

Portals are like windows that allow you to look at and used data from a different table/file. This can be very handy in some cases.

### At HPO

We have developed many different FileMaker Pro programs. One is for our spectroscopy data. The following is based on a program we use for our UBV photon counting photometry.

### Photometry Program Design



The Main Menu table/file allows you a starting place and a place to select what you want to do.

The blue tables/files are where reusable data is stored. This data can then be looked up and entered automatically in other tables/files.

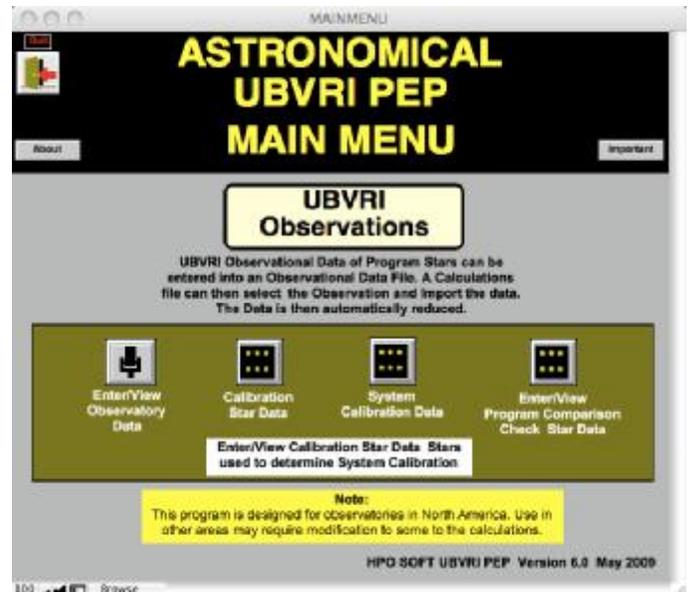
The Data Entry & Processing table/file is where you enter your observational data. There will be one observation per record. This can be one night, or one star per night. Multiple stars for the night can be multiple records. Preliminary processing is done to create net counts, determine air mass and HJD. A unique Observation ID is created for each record.

The Data Reduction & Archiving file is where you enter the Observation ID and all required information is looked up and entered automatically in the data fields for that observation. Data reduction is then done automatically to calculate extra-terrestrial magnitudes, average them and determine a stan-

dard deviation. The final data is then archived and specific records can be found and sorted. Lists and reports can be created. Data can be viewed, printed and exported.

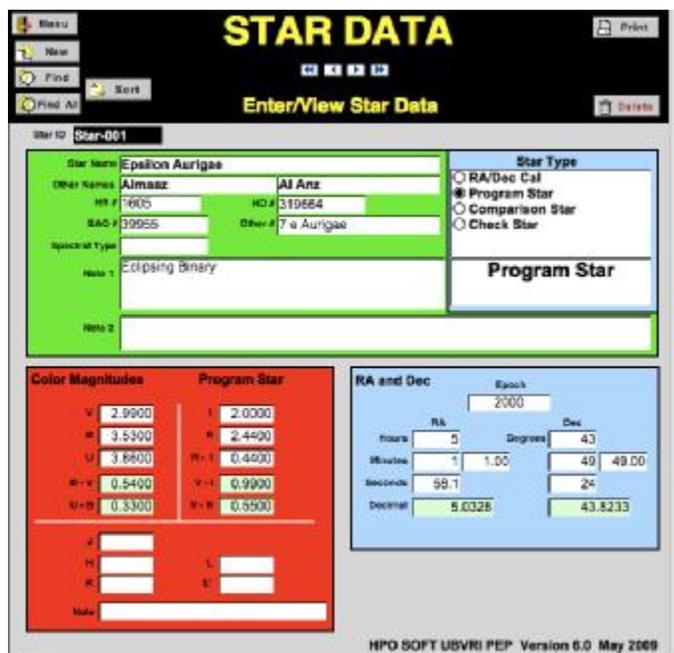
The following are screen shots of the program used at HPO for managing photometry data.

### Main Menu File/Table



Here is where the user is taken when starting the program. From here the user can click on button to navigate to other files/tables of the program.

### Star Data File/Table



# Dispatches from the Members

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## Personal Astronomical Software

by Jeff Hopkins

This is where the user can enter data for each star of interest. A unique Star ID is automatically entered and identifies the record with the star data.

### Observatory File/Table

This is where the user can enter data for an observatory or multiple observatories. A unique Observatory ID is automatically entered for each observatory.

### Calibration File/Table

This is where the user can enter data for each calibration set. Some observatories like to periodically recalibrate their equipment. A unique Calibration ID is automatically entered for each calibration set.

### Data Entry File/Table (Layout 1)

This is the first layout of several for the data entry table/file. Here the initial data about the observation is entered, Date, comments, etc.

### Data Entry File/Table (Layout 2)

This is the layout where the specific data for the observation is entered. The observation time, for each filter the raw star + sky counts, sky counts are entered. Net counts for each time and filter are calculated. Dead time (for photon counting is figured in. Nightly extinction based on the comparison

star's values is calculated for each band.

### Data Reduction/Archive File/Table (Layout 1)

This is the first layout for the data reduction table/file. An observation ID is selected from a pulldown list. All the results of the initial processing for that observation are looked up and automatically entered into the data fields. The "Go To Reduced Data" button is then clicked. **Data Reduction/Archive File/Table (Layout 2)**

This is the layout of the data reduction table/file that shows the results of the data reduction. The reduced data is automatically archived in the dat fields for that record.

### Graphics

One thing that FileMaker Pro does not have is a means to plot data. The easiest way to handle this is to export the data set that you want to plot as a text file, then use a graphics program to import the data and do the plotting. Excel works well in that respect.

### Learning Curve:

Like any new program, FileMaker Pro has a learning curve. There is a tutorial that comes with it and a multitude of after-market books are available. You can start off simple and get as complex as you want. You are limited only by your imagination. For more information about FileMaker Pro see:

[www.filemaker.com](http://www.filemaker.com)

FileMaker Pro will work with Windows and Mac OSX. There are two versions, the basic version for \$299 and the Advanced version for \$499. It is unlikely you would need the Advanced version. There is a free 30 day trial version that you can download. You might even shop around for used copies of older versions.

### Conclusion:

Anyone who does serious astronomical observing will soon find the requirement to store and handle data becomes overwhelming. While a spreadsheet can offer some relief, a database will give you control and power you never dreamed of.

While I have no connection to FileMaker, I have worked with it since version 1.0 in the late 1980's. If you have any questions, I'd be happy to try to help. Just e-mail me at [phxjeff@hposoft.com](mailto:phxjeff@hposoft.com).