



Telescope Tales: The UM-Dearborn Observatory Unmasked (Part II)

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Abstract: The installation of the 0.4-meter (16-inch) diameter Ritchey-Chrétien telescope in the observatory on the UM-Dearborn campus in April 2007 marked a major step toward our goal of providing meaningful opportunities for our students and those at our coordinating institution, Henry Ford Community College, to engage in study and research in astronomy using professional grade software and instrumentation. But the path from installation to full functionality, like that of the design and construction of the observatory complex itself, was fraught with its own set of surprises and challenges. Here we discuss some of the problems that beset us during the initial commissioning phase of telescope set-up and the means that were employed to overcome them. We then describe the impact that the completion of the new observatory facilities has had on the manner in which astronomy is now (and will be) taught at UM-D and HFCC. We highlight particularly the development of some new laboratory activities at both the introductory and advanced levels, a new astronomy minor program at UM-D, and an expanded program of public events co-sponsored by our two institutions. While perhaps not unique or widely transportable, we conclude that this model of collaboration between 4-year and 2-year schools of higher education is nonetheless worthy of emulation where possible for its effective use of increasingly scarce resources and for the mutual intellectual and personal benefits it affords the participants.

I. Introduction

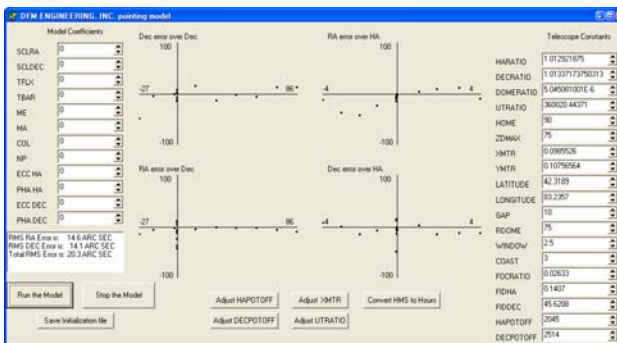
- **April 2007**: 0.4-meter (16-in.) Richey-Chrétien telescope installed at UM-Dearborn observatory.
- Here we spin the tale of the commissioning, inaugural use, and future plans and promise of the telescope & observatory.
- **The Bumpy Road to Functionality**: pointing, tracking, vibrations, seeing – and all that jazz.
- **Project Impact**: on the collaborating institutions, our community and beyond.

II. Commissioning Phase: “First Night(s) Blues”

- Alignment & Collimation

The
“Pointing
Model”

RMS
Error:
<20”

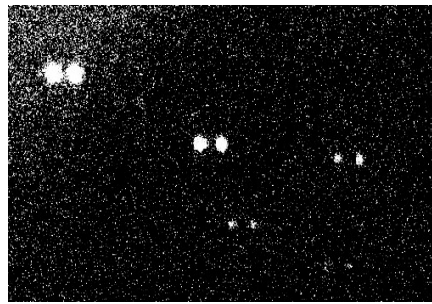




Astronomy

Tracking Error: $\sim 0.7''/\text{min}$

$\Delta t \sim 22\text{min}$



$\sim 15''$



Astronomy

- Vibration Issues & Their Solution



$\sim 1'$





Astronomy

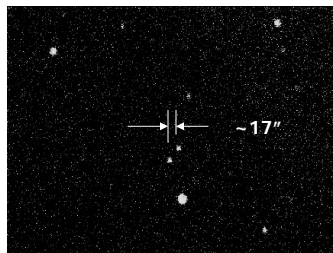


The "Penthouse"



Astronomy

- Thermal Issues: Seeing Matters!



(a)



(b)

5 sec exposures: (a) Lab door closed; (b) Lab door open.



III. Full Functionality Achieved

- The Introductory Labs

P131 Science Learning Center Module

The Sky: An Interactive Tutorial

Purpose:

This module is designed to provide you with a basic introduction to *The Sky*, the software package in use at the UM-D observatory for displaying the local sky, identifying celestial objects of interest, and controlling the telescope. Not every function or feature of this software will be explained or exploited in this short module, but some of the most important ones that you will need to successfully complete your outdoor observing assignments will be covered. You are welcome, indeed encouraged, to explore some of the other provisions of this package as you have time and interest. Feel free to return to the SLC and investigate *The Sky* in greater detail after you've satisfied the minimum requirements for P131. Good luck and have fun!

P131 Observing Program

Fall 2007

Purpose: This exercise will help develop students' skill and confidence in locating and identifying bright stars, constellations, planets, and selected non-stellar objects present in the night sky with their unaided eyes and/or with small telescopes.

Instructions: The table below includes four categories of celestial objects. In each case, several examples are given of specific objects that can be observed in the night sky during the Fall season (September – December). Your challenge is to locate and identify at least two(2) objects in each class and then to examine them with the 20-cm telescopes provided for your use on the rooftop area outside the observatory.



Stars	Constellations	Non-Stellar	Solar System
Alberio	Andromeda	M13	Moon
Alpheratz	Auriga	M15	Jupiter
Altair	Cassiopeia	M27	Uranus
Capella	Cepheus	M29	Neptune
Deneb	Cygnus	M31	
Mizar/Alcor	Hercules	M33	
Polaris	Lyra	M45	
Vega	Pegasus	M57	
	Perseus	M81	
	Ursa Minor		
	Ursa Major		

Physics 131 Observing Form

Name: _____ Date: _____

Telescope (type, aperture & focal length): _____

Eye piece(s): Focal length(s): _____ Magnification(s): _____

Local time (use a 24-hour clock): _____ Universal Time (UT): _____

Temperature: _____ °C _____ °F

Sky conditions (e.g., % cloud cover, estimated wind speed, transparency, seeing, etc.): _____

OBJECT (common name, catalog number [e.g., M106], etc.): _____

CHARACTERISTICS:

(1) What kind of object is this? _____

(2) What is its color? _____

(3) What is its overall shape? _____

(4) Describe any other distinctive features of the object: _____

(5) Coordinates (RA, Dec) _____ (Alt, Az) _____

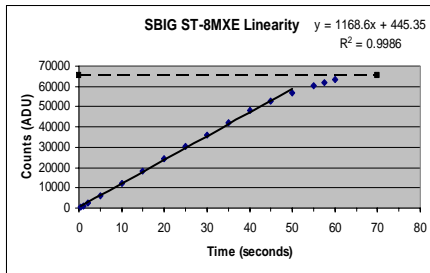
Apparent: _____ Orientation: _____

FOV: _____

Night Assistant Signature: _____

- The Advanced Lab & Independent Projects

CCD Characterization Lab



Read Noise: 21 electrons/pixel

Dark Current: <1 e/pixel/sec

Gain: 2.6 electrons/ADU

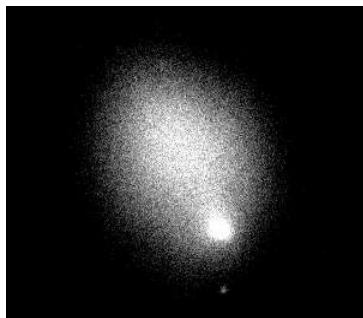
M67

Photometric Studies of Open Clusters, Variable CP Stars, Near-Earth Asteroids, etc.



- Public Programming & Special Events

Comet Holmes



Lunar Eclipse



- **Seasonal Schedule**



Planetarium and Observatory Schedule
Spring 2008

Subject	Date	Time	Location
Nothing Good Can Stay? - A Spang Star Talk	Monday, March 24, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, March 25, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Tuesday, April 01, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, April 01, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Wednesday, April 02, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, April 08, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Tuesday, April 15, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, April 15, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Tuesday, April 22, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, April 22, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Tuesday, April 29, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Tuesday, April 29, 2008	8:00-10:00 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Wednesday, May 06, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Saturday, May 15, 2008	10:00-11:30 PM	Observatory
Nothing Good Can Stay? - A Spang Star Talk	Thursday, May 14, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Friday, May 20, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Saturday, May 23, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Sunday, June 01, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Sunday, June 08, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Sunday, June 15, 2008	8:00-9:30 PM	Planetarium
Nothing Good Can Stay? - A Spang Star Talk	Sunday, June 22, 2008	8:00-9:30 PM	Planetarium
Public Observing Session	Friday, June 26, 2008	10:30 PM-Midnight	Observatory

Planetarium: Doors to the Planetarium open 15 minutes prior to and will be closed at the listed start time. For safety reasons, there can be no life attendances to the show. The Planetarium is located in room S-138 of the Science Building on the campus of Henry Ford Community College. The Planetarium is located in room S-138 of the Science Building on the campus of Henry Ford Community College. For driving directions and maps of the campus please visit <http://www.hfccc.edu/visit/visiting.htm>. For further information about the planetarium, contact Mike LuPriesse at mlopez@hfccc.edu.


Observatory: Observing sessions require suitable sky conditions. To learn the status of any event, call the observatory hotline at 313-652-6008 beginning one hour prior to the scheduled start time. Inclement weather or other unforeseen adverse circumstances may cause the cancellation of a scheduled event.

Observing sessions are held outdoors for the most part, so please dress appropriately to maintain personal comfort during these visits. General observatory sessions will be available at the observing sessions, but you are welcome to bring your own telescope if you wish. The use of an observatory is restricted to the staff of the Science Learning and Research Center (SLRC) on the campus of The University of Michigan-Dearborn. For driving directions and maps of the campus please visit http://www.umich.edu/visit/visiting_dirs.htm. For further information about the observatory, visit our website at <http://www.umich.edu/observatory> or e-mail us at sky_obs@umich.edu.

During normal business hours, additional information is also available by calling the Department of Natural Sciences at 313-652-5277.

All events are free and open to the public.

Presented by
The Henry Ford Community College Department of Physics and Earth Sciences &
The University of Michigan-Dearborn Department of Natural Sciences



IV. Plans and Promise

- **Earth and Sky: The EIC Connection**



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Astronomy

- UM-Dearborn Astronomy Minor

Astronomy Minor Program Requirements

Pre-requisites:	ASTR 130 and ASTR 131 (formerly PHYS 130 and PHYS 131)	4 hours
Requirements:	Twelve(12) additional hours of course work at the 300+ - level to include PHYS 305 and a choice of any three(3) of the following six(6) courses:	12 hours

ASTR 361 *Observational Techniques*
(new course: 2h lecture + 3h lab.)

ASTR 380 *Advanced Astronomy*
(new course: 3h lecture.)

ASTR 390/490 *Topics in Astronomy*

ASTR/GEOL 407/507 *Planetary Geology*
(new course: 3h lecture.)

ASTR/PHYS 421 *Stellar Astrophysics*
(revision of existing course: 3h lecture.)

ASTR/PHYS 440 *Galaxies and Cosmology*
(new course: 3h lecture.)

ASTR 495, 498 and/or 499 *Independent Study/Research Courses* (new courses: 1 – 3h laboratory and/or discussion.)



Astronomy

- SLRC Floor Mosaic Project



**M82: Star-
burst Galaxy
in Ursa Major**



V. Finish

- **Commissioning:** Four months to vibration-free operation characterized by excellent pointing accuracy, good tracking and adequate seeing.
- **Impact:** New student labs and independent study options; enhanced public outreach programming; expanded professional development opportunities.
- **Future Plans:** Course/curriculum development (e.g., new astronomy minor); Astronomy as art (SLRC floor mosaic project).
- **A Model Worth Emulating?** Benefits of the community college – university connection: shared facilities, equipment, staff & vision.