

Lockhart Planetarium Session No. 2
INTRODUCTION TO THE AUTUMN SKY
(Duration: 1.5 - 2 hrs)

Summary of Presentation

INTRODUCTION TO STELLARIUM: BEGINNING USAGE

- Open source cross-platform free planetarium software
- Useful in Observing Exercises
- Demonstration of most frequently used controls
 - toggles - constellations, grids, ground
 - drag & move
 - search for Andromeda galaxy
 - zoom function

The Status Bar

- Location
- Field of View
- Frame Rate
- Date
- Time (ref to Universal Time)

Side Controls - Setup/Customization

- Location on the Earth
- Time & Date Setting
- Sky & Viewing Options
- Search Window
- Configuration Window
- Help

Bottom Controls - Most Frequent Usage

- Constellation Lines
- Constellation Labels
- Constellation Art
- Equatorial Grid
- Azimuthal Grid
- Ground
- Cardinal Points
- Atmosphere
- Night Mode
- Quit

QUICK INTRODUCTION TO THE AUTUMN SKY

Review of North Circumpolar Sky Constellations

- review terminology & constellations from Planetarium Session 1
- the altitude of North Celestial Pole corresponds to the observer's latitude
 - also radius of NCP circular cap
 - stars within the cap are seen all night long all year round, never rising or setting
- Aside: can be demonstrated with a simple geometric proof

Introduction to the Constellations in Season

- stars that rise and set
- seen early in the evening

The Equatorial Coordinate System

- apparent path of stars across the celestial sphere used to introduce the equatorial coordinate system
 - celestial equator is fundamental reference circle
 - declination - N & S of celestial equator
 - hour circles of Right Ascension 0-24h from W to E
- provides fixed coordinates for stars cf alt-azimuth system
- inclined to alt-azimuth system by colatitude (angle of rising & setting)
- practical usage
 - sidereal time - what stars are in the sky?
 - determine time object in sky

The Magnitude System & Distance Determination

- Apparent Visual Magnitude
 - combination of intrinsic brightness & distance
- Hipparchus' brightness numbering scheme
 - brightest magnitude 1, faintest magnitude 6, equal steps of brightness by eye
 - eye has a nonlinear response to brightness
- regularizing Hipparchus' scheme
 - define 5 magnitude change to correspond to a 100-fold change in brightness
 - so 1 magnitude change corresponds to ~ 2.5 change in brightness
 - 2 magnitudes ~ 6.25 (or 2.5×2.5) change in brightness (note multiplication not addition)
- Absolute Visual Magnitude
 - removes accident of distance so measure of intrinsic brightness
 - magnitude at 10 parsecs (definition of parsec and equivalence in light years)
- knowing both magnitudes allows distances to be determined (standard candles)

CONSTELLATIONS

- *Boötes the Herdsman*
 - contains the asterism of the Kite
- *Corona Borealis the Northern Crown*
- *Hercules*
 - contains the asterism of the Keystone
 - kneels on the head of the Dragon
- *Lyra the Harp*
 - the bright star Vega is part of the asterism of the Summer Triangle
- *Cygnus the Swan (First Nations' Canada Goose flying down the Milky Way in fall)*
 - asterism of the Northern Cross
 - the bright star Deneb is part of the asterism of the Summer Triangle
- *Aquila the Eagle*
 - the bright star Altair is part of the asterism of the Summer Triangle
- *Ophiuchus the Serpent Bearer*
- *Serpens Cauda & Caput*
- *Pegasus the Winged Horse*
 - contains the asterism of the Great Square
 - number of stars within the square indicate atmosphere's transparency
- *Andromeda*
 - the great galaxy in Andromeda found by waltzing
 - 2.2 million light years distant
 - farthest object seen with the naked eye
- *Sagittarius the Archer*
 - contains the asterisms of the teapot and teaspoon
 - direction to the centre of our Galaxy
- *Scorpius the Scorpion*
- *Libra the Scales*
- *Capricornus the Sea Goat*
 - asterism of the Big Smile

REFERENCE HANDOUTS

- Notes on Observing
- General Information on Observing
- StarCharts
- Observing Exercises