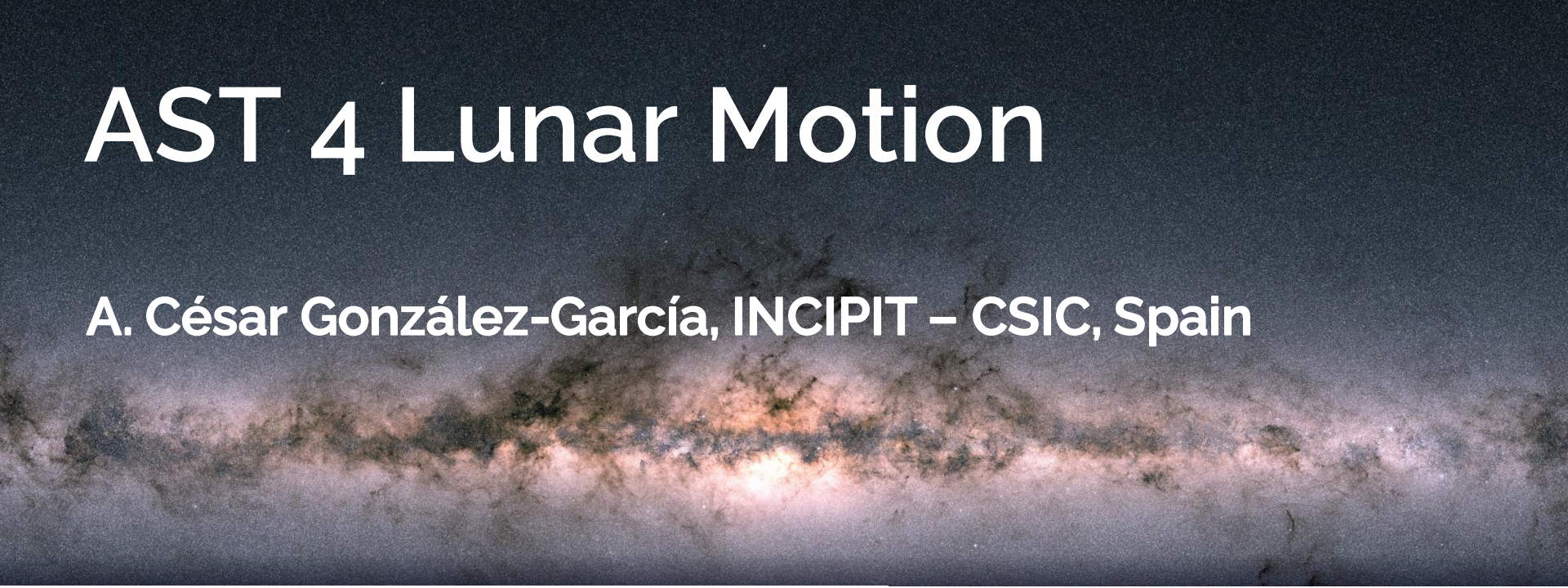
AST 4 Lunar Motion

A. César González-García, INCIPIT – CSIC, Spain



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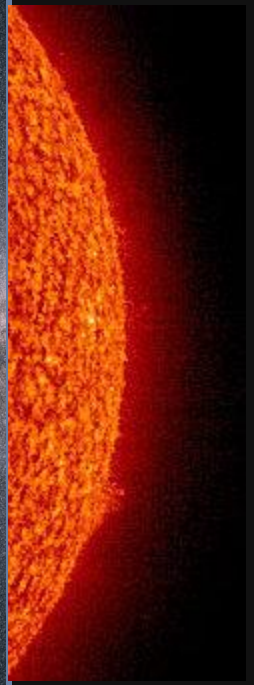


Lunar cycles

Synodic month: two equal lunar phases: 29.53059 days

Sidereal month: same position against the stars: 27.32166 days

Tropical month: two passes through same celestial longitude: 27.32158 days

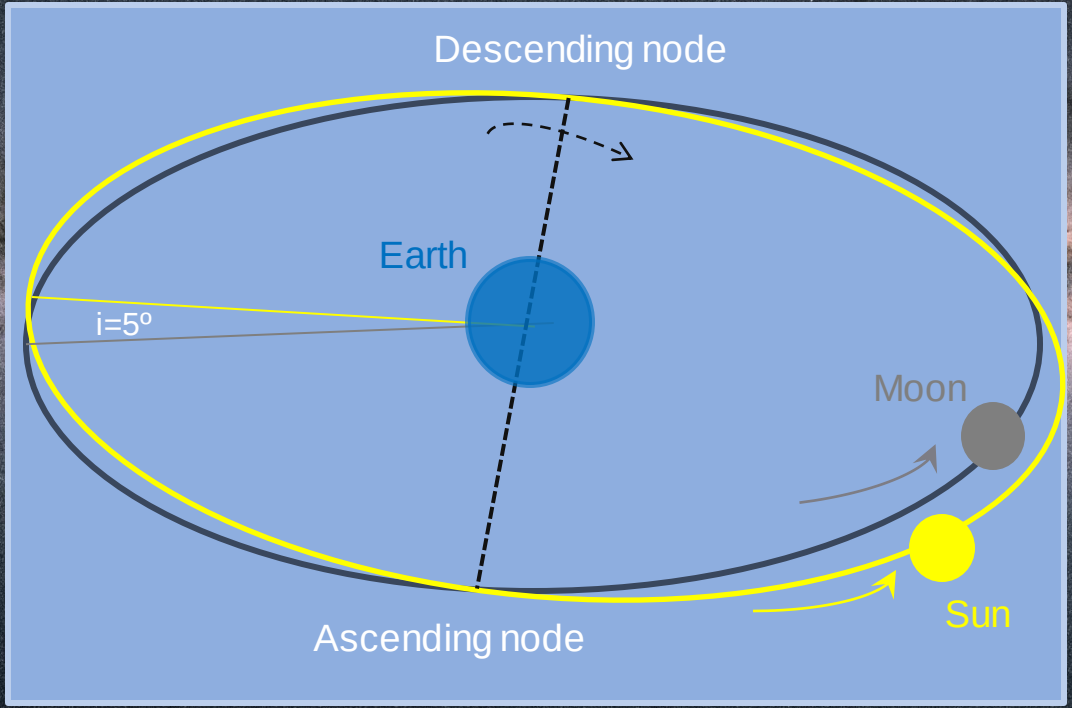
Sunrise-> waning crescent

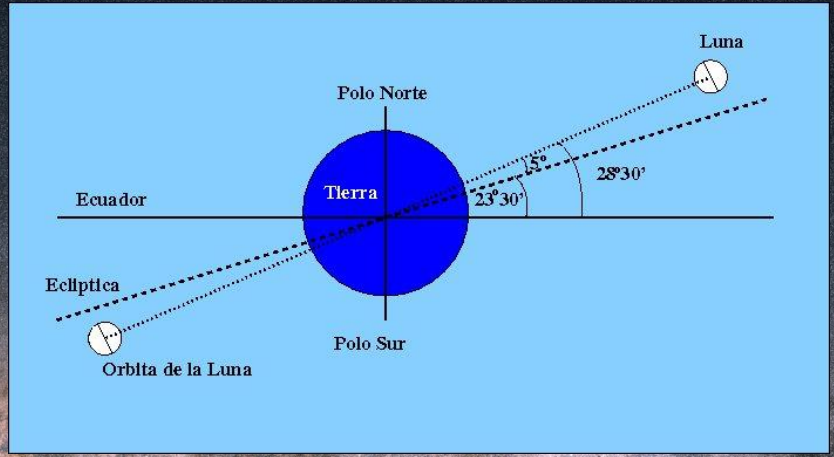
Sunset -> waxing crescent

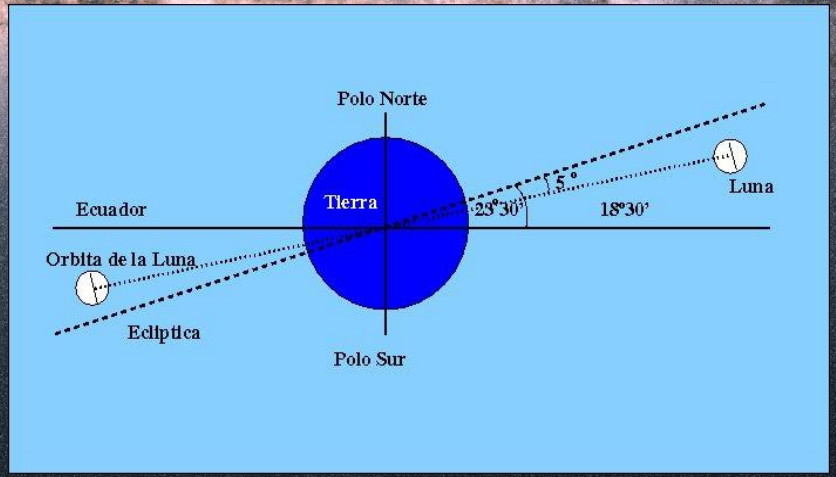
New Moon

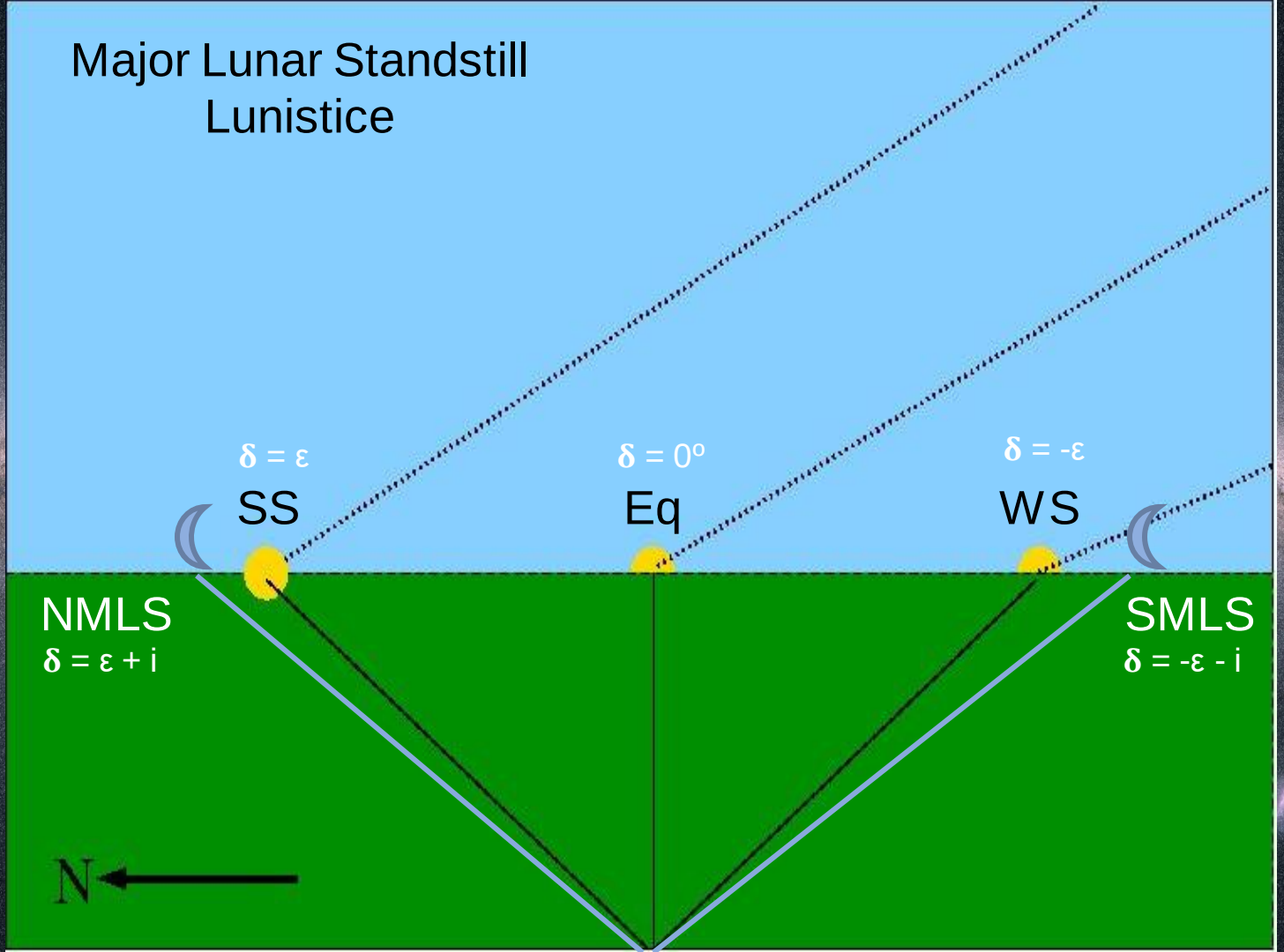
Full Moon

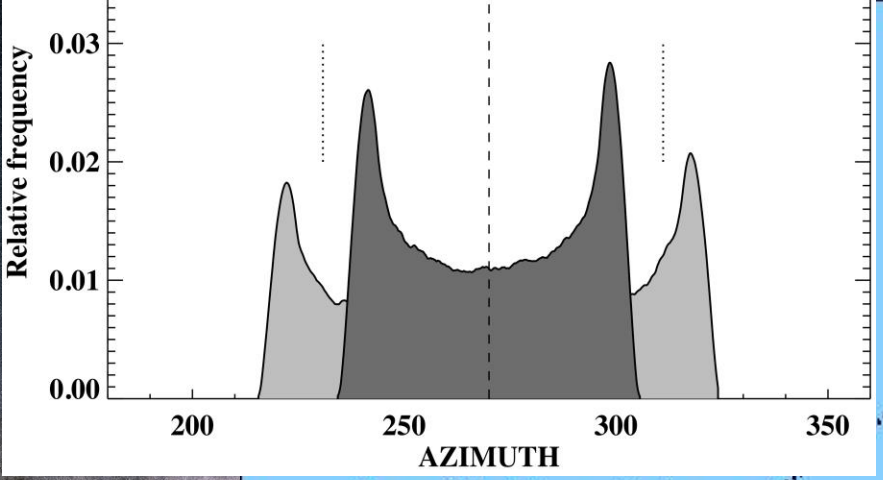
Retrogradation of the line of nodes
18.61 years
Eclipse (draconic) cycle
18.03 years








Major Lunar Standstill
Lunistice
δ = ε
SS
δ = 0º
Eq
δ = -ε
WS
NMLS
δ = ε + i
SMLS
δ = -ε - i
N



Northern Mayor Lunistice

Northern minor Lunistice

Summer Solstice

NMLS

$\delta = \varepsilon + i$

NmLS

$\delta = \varepsilon - i$

N

The problem of incommensurability

Synodic month: 29.5306 days

Tropical year: 365.2422 days

12 synodic months= 354.37 days (~11 days short)

13 synodic months= 383.9 (~18 days long)

Solutions

- Ignore (Islam)
- Using a pure tropical year and ad-hoc divisions
- Adjusting the two cycles (3, 8, 19 years…)

Further reading

- González-García, A. C., 2015. “Lunar Alignments, Identification and Analysis”. In Handbook of Archaeoastronomy and Ethnoastronomy, edited by C. L. N. Ruggles, 493–506. New York: Springer. https://doi.org/10.1007/978-1-4614-6141-8_37
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Credits

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Design

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