

## ***ASTRONOMIA NOVA OVERVIEW***

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### **GOALS**

- 1. Introduce reforms to orbital theory for Mars to remove all excessive discrepancies vs. observation**
- 2. Determine true motion of Mars at least with respect to the Sun, if not the fixed stars, for 1580-1604**
- 3. Establish Copernican theory for Mars-Earth-Sun**

### **PROBLEMS**

- 1. Working from a limited set of observations, 1580-1604, restricted to geocentric longitudes & latitudes**
- 2. Must use theory to reach any conclusions re orbital motion, but without begging questions re the motion**
- 3. Observations were of limited precision (though with estimated bounds of the limits), and corrections for parallax and atmospheric refraction were suspect**
- 4. Supplemental theories, e.g. of Earth-Sun orbit, can introduce extraneous sources of discrepancy**

### **SUPPLEMENTAL THEORIES EMPLOYED**

- 1. Tycho's Earth-Sun theory, along the way refined to incorporate bisection of eccentricity**
- 2. Vicarious hypothesis for heliocentric longitudes of Mars about the true Sun**
- 3. (In places) Tycho's theory of heliocentric longitudes for Mars about the mean Sun**
- 4. Assumption that Mars orbits the Sun, not the Earth (while not foreclosing a Ptolemaic representation)**

## Questions of Evidence

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To what extent did the evidence presented in *Astronomia Nova* on the Mars and Earth-Sun orbits exclude alternatives to:

1. The line of apsides passes through the true Sun?
2. The orbit lies on a plane passing through the true Sun at a constant angle of inclination with respect to the ecliptic?
3. The bisection of the eccentricity of the Earth-Sun orbit?
4. The diametral distance rule?
5. The area rule?
6. Mars's trajectory is an ellipse?

To what extent did the evidence presented in *Astronomia Nova* support the Copernican system:

1. Over the Tychonic system?
2. Over the Ptolemaic system?