

The Oldest Computer, the *Antikythera Mechanism*: Epitome of Greek Philosophy

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"The origin of all technical achievements is the divine curiosity [of Socrates/Plato] and the play instinct of the working and thinking researcher as well as the constructive fantasy of the inventor..."

Albert Einstein, speech on the radio at the opening of the 7 Deutsche Funkausstellung in Berlin, 1930.

The so called *Antikythera Mechanism*, or *Pinax* or *Sphere*, as its original name was, is the oldest known advanced scientific instrument, the first computer and mechanical universe.

Subverts everything believed about the lack of interest of the Greeks in technology. Seems to be offseason, in fact it is the epitome of Greek Philosophy.

It is the epitome of philosophy because to build a mechanical Cosmos, such as the mechanism, you need to understand, embrace and practice the Greek philosophy, the philosophy of the Ionian philosophers, and you got to put it to work. We can say, in fact, that the signature of Pythagoras is in the mechanism, as on one of the gears the Pythagorean pentagon is engraved right in the middle of a gear, around its shaft. The Mechanism is the culmination of Pythagorean philosophy, their teaching and understanding that led to our knowledge of the Cosmos with the introduction of mathematics to understand and predict natural phenomena. This process was based on observations, experiments and the perception that Nature is harmonious, and that the Cosmos vibrates with the so called *Music of the Spheres*. The Pythagoreans discovered all these with properly designed and realized experiments with musical instruments, hammers, strings etc and appropriate measurements followed with appropriate theoretical analysis with mathematics that eventually led them to the inductive thinking formulation of the laws of physics and modern civilization with today's technology.

Built by Greeks, probably between 150 and 100 BC and, as demonstrated by appropriate calculations based on our measurements on the mechanism, the instrument is based on measurements taken by Archimedes and his students at a philosophical school that he had in Syracuse. It turns out now that Archimedes was a physicist and astronomer and had school and his students continue astronomical work for at least few decades, obtain measurements of eclipses using a clock (like the one we know from detailed description Archimedes constructed). The pupils of Archimedes eventually send tables with astronomical data, including eclipses observations, to another Greek who constructs the instrument. As Hipparchus is perhaps the only and the greatest astronomer Greek at that time who works in Rhodes, that has a lot of money and excellent tradition in metallurgy and technological constructions.

The mechanism is a complex exact analog and digital computer that works with carefully designed and manufactured gears (Bytes) with small teeth (bits). The gears perform certain mathematical operations as they move around and drive shafts and indicators and pointers showing the position of various heavenly bodies, the Sun, the Moon and possibly the planets in circular and spiral scales (analog part). That was the first mechanical universe, the first planetarium.

Findings of the wreck (statuettes and conical weights) combined with ancient texts, lead us to a working hypothesis that perhaps the mechanism was at a weight and float and might have read in automatically as texts describing clock of Archimedes or as medieval clocks.

Of particular importance is the discovery that the motion of the Moon follows to a good approximation Kepler's second law, and perhaps even all three laws of Kepler, discovery completes initial study five years ago. The motion of the Moon is very realistic using a train of 4 gears, two of them linked with an elliptical bond (pin in an elliptical slot) and the trajectory and velocity of the Moon probably follows the three laws of Kepler.

The Mechanism probably had a system for planets with planetary gears, as we read in the manual and in ancient texts describing similar mechanisms.

All technical achievements of today are based on the Antikythera Mechanism.

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