

SAW Seminar: Mathematical practices in the context of the astral sciences

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An astronomical syntax, based on Hipparchus: the Papyrus Fouad inv 267 A.

Abstract: The papyrus Fouad 267 A, discovered by Jean-Luc Fournet in the collection preserved at IFAO in Cairo, contains a long fragment of a particularly interesting astronomical treatise. The anonymous author gives an example "to calculate a birth" on the night of 8 to 9 November AD 130. The fragment is confined to the calculation of the longitude of the sun. This is calculated with the help of a "syntax" based on Hipparchus, from which the text mentions an otherwise unknown observation, that of the Summer Solstice of 158 BC June 26. What is unique in this text is calculation in parallel of three different longitudes: the sidereal longitude (based on the sidereal year of $365 \frac{1}{4} + 1/102$ days), the 'mean' longitude (based on the year $365 \frac{1}{4}$ days) and the tropical longitude (based on the tropical year $365 \frac{1}{4} - 1/309$ days). The author refers to Hipparchus, and mentions the precession of the equinoxes: one can see from the calculations that this is estimated as 1° in 78 years approximately. The author uses chronological periods similar to those of Ptolemy (periods of 25 Egyptian years, single years, Egyptian months, Egyptian day, hours), but also large periods of 30,000 and 7,000 years, unique in the history of Greek astronomy. The calculations presume a model with an eccentric identical to that of Ptolemy. The rest of the text considers the conversion of times according to a table of oblique ascensions somewhat different from that of the *Handy Tables* of Ptolemy, and also the calculation of the declination of the sun. The *Syntax* to which the text refers is a complex and refined work of astronomy, at a level comparable to that of Ptolemy, and remarkable for the precision of its parameters and the complexity of the combinations of numbers employed.