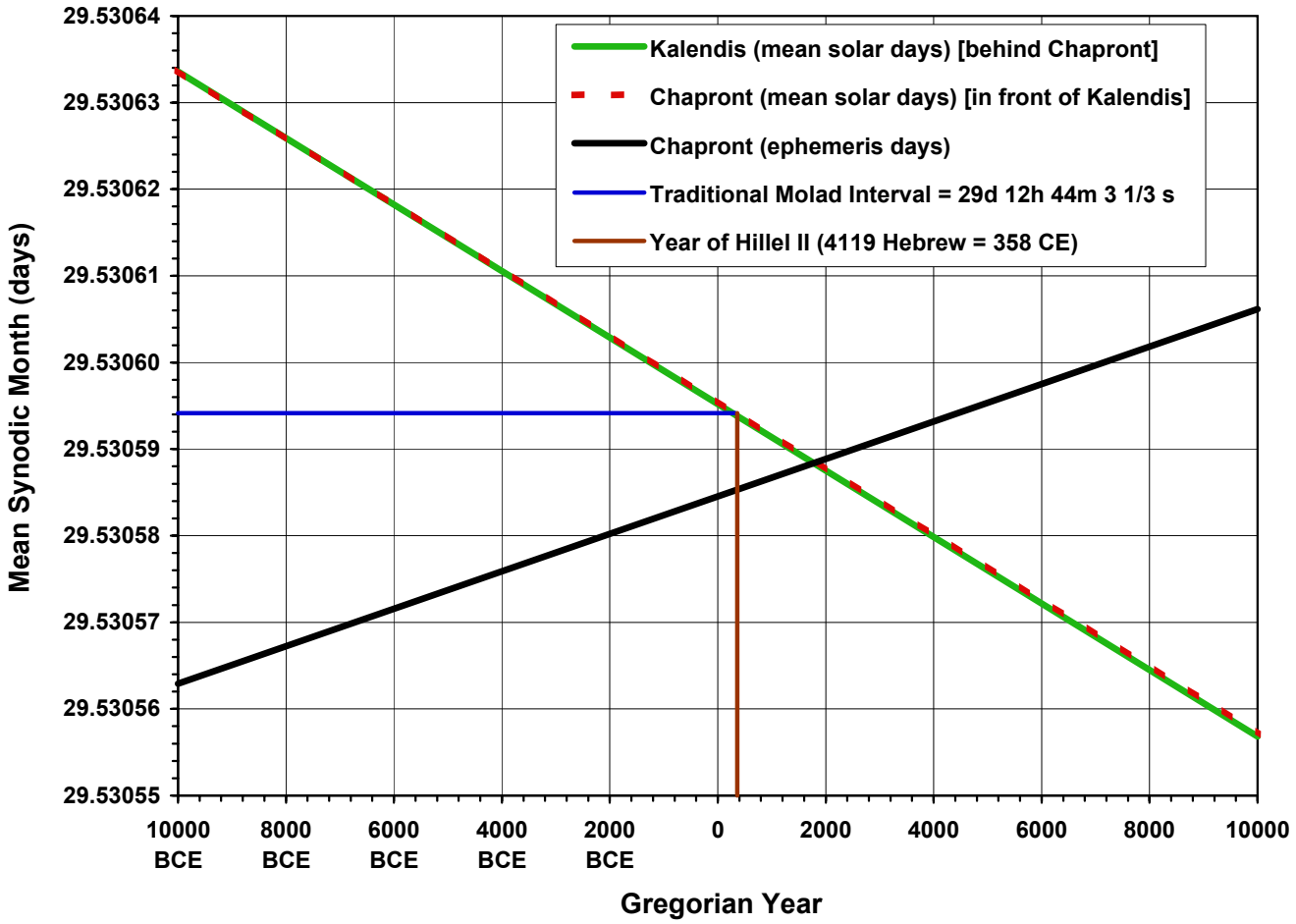
Validation of Astronomical Algorithms as Implemented in "Kalendis":

Synodic Month: Chapront *vs.* Kalendis



Data for the chart above was computed at intervals of 100 years (as of January 1st at the end of each Gregorian century).

Mean Synodic Month formulae:

Kalendis: Derived from quadratic regression of the Hebrew Calendar Molad minus Actual Lunar Conjunction.
29.530595200803 - *M* * 1.05048488115424E-11 **mean solar days**,
where *M* is a moment that is the number of days since the Gregorian epoch (January 1 of proleptic year 0).

Chapront: Derived from Laser Lunar Ranging, published as Ephemerides Lunaires Parisiennes theory [ELP2000]
29.530588853 + 0.0000002162 * *T* **ephemeris days**,
where *T* is the number of Julian Centuries relative to J2000 (January 1, 2000 at Noon).

Note: Kalendis formula as a function of Julian Centuries = 29.530587531 - 0.000000383689746 * *T* **mean solar days**.

Conversion of the Chapront Synodic Month from Ephemeris Days to Mean Solar Days:
For each date plotted, compute the ephemeris day length of solar days based on the 10000 calendar days centered on that date:
Day_No = *Fixed_From_Gregorian* (*Gregorian_Year* , January , 1)
M1 = *Dynamical_From_Universal* (*Day_No* - 5000) *M2* = *Dynamical_From_Universal* (*Day_No* + 5000)
Chapront_Mean_Solar_Days = 10000 * *Chapront_Ephemeris_Days* / (*M2* - *M1*)
Atomic_Seconds_Per_Solar_Day = (*M2* - *M1*) * 86400 / 10000 = (*M2* - *M1*) * 216 / 25 [optional, not used for this chart]

Chapront's synodic month, after conversion to mean solar days, is almost superimposed upon the Kalendis synodic month line.
For the year of Hillel II the synodic month, in mean solar days, is shown to be equal to the Traditional Molad Interval.

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From "Hebrew Calendar Studies" page at <`http://individual.utoronto.ca/kalendis/`>.

Calendar and astronomy calculations as per "Calendrical Calculations: The Millennium Edition",
by Edward Reingold & Nachum Dershowitz, 2001 (Cambridge University Press).