Lunar theory in Old Babylon

Mankind doing its best without trigonometry

Seminar on Astronomy in Old Orient

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These slides and somewhat extensive notes are to be found on my webpage `www.sturzhang.de/Astro.html`

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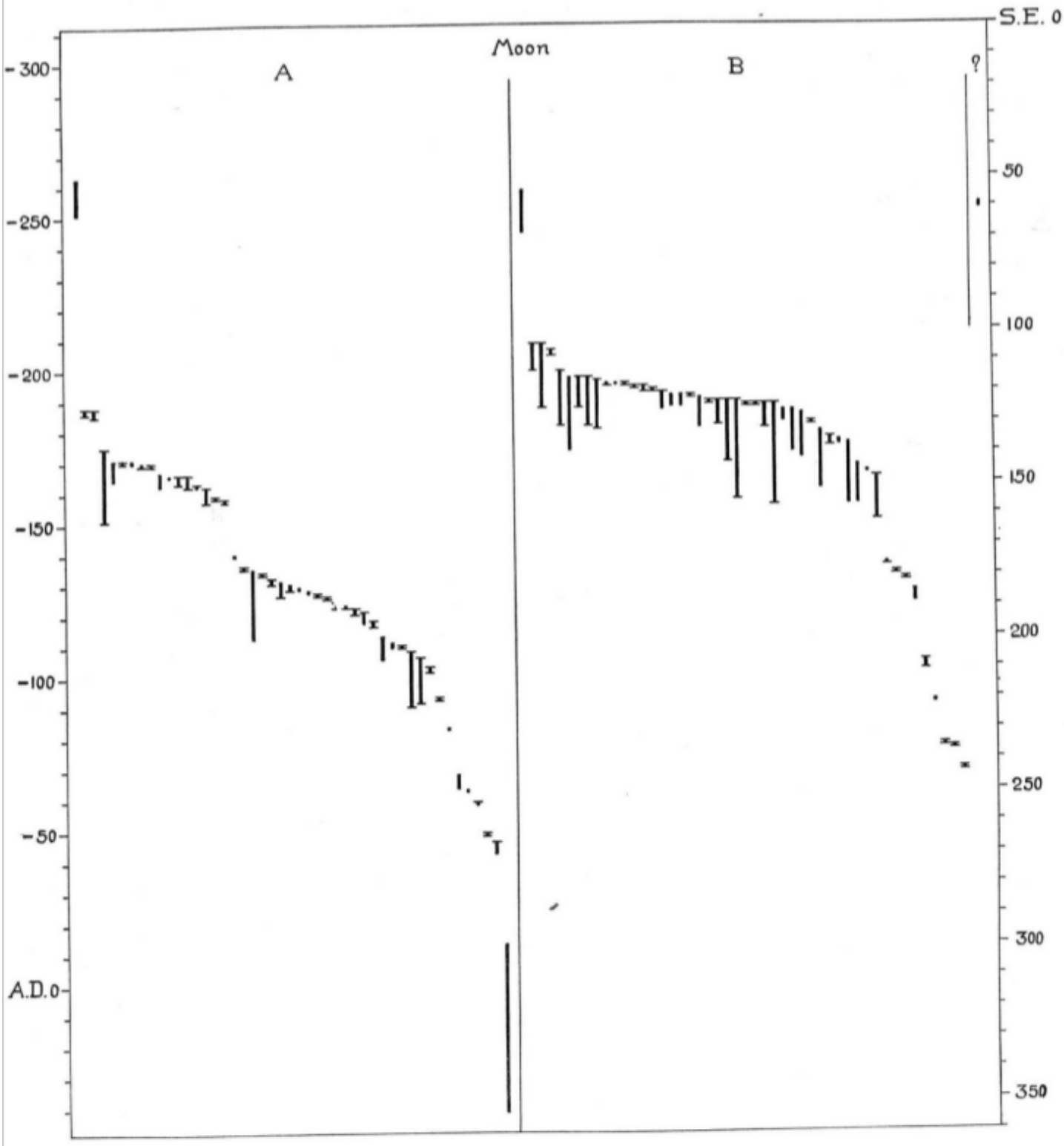
What we do today:

- Historical introduction
- How you would make a lunar calendar
- How the Babylonians did make a lunar calendar
  - Movement of the Sun / Systems A and B
  - Movement of the Moon
  - Daylight
- Conclusions & final remarks


Moon
A
B
?
S.E. 0
-300
-250
-200
-150
-100
-50
A.D. 0
50
100
150
200
250
300
350

What do we have?

- ∼100 tablets from an archive in Uruk
  - quite complete, with many joined parts
- ∼200 tablets from elsewhere

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- ∼100 tablets from an archive in Uruk
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- ∼200 tablets from elsewhere (probably Babylon)
  - Mainly the Spartali collections of the British museum
  - However we know of the existence of astronomical tablets in Babylon

Dating

- Date column is first column – particularly exposed to damage
- Restore the dates by using
  - real astronomically computed positions
  - ancient methods
- By use of a computer both can be achieved without computational effort
- Assume the beginning of the ephemeris to be roughly the date of writing

Moon calendar

Moon calendar of the Babylonians

System A

No. 9 Obv. III:

	[še]	16,18,45	hun	♈	$+28,7,30-30$	
3,5	[bar]	14,26,15	múl	♉	$+28,7,30-30$	
	[gu_4]	12,33,45	maš	♊	$+28,7,30-30$	
	[sig]	10,41,15	kušu	♋	$+28,7,30-30$	
	[šu]	8,48,45	a	♌	$+28,7,30-30$	
	[izi]	6,56,15	absin	♍	$+29,35,45-30$	$\Delta d^{\text{slow}} = 6;3,45$
						$\Delta d = 30-0;24,15$
	kin	[6,32]	rín	♎	$+30-30$	
	dy	[6,32]	gír-tab	♏	$+30-30$	
	apin	6,[32	p]a	♐	$+30-30$	
	gan	6,32	[maš]	♑	$+30-30$	
	ab	6,32	g[u]	♒	$+30-30$	
	[zíz]	6,32	zib-me	♓	$+29,24,15-30$	$\Delta d^{\text{quick}} = 20;28$
						$\Delta d = 28;7,30+1;16,45$
	[še]	5,56,15	[hu]n	♈		

System A

Procedure text 200:

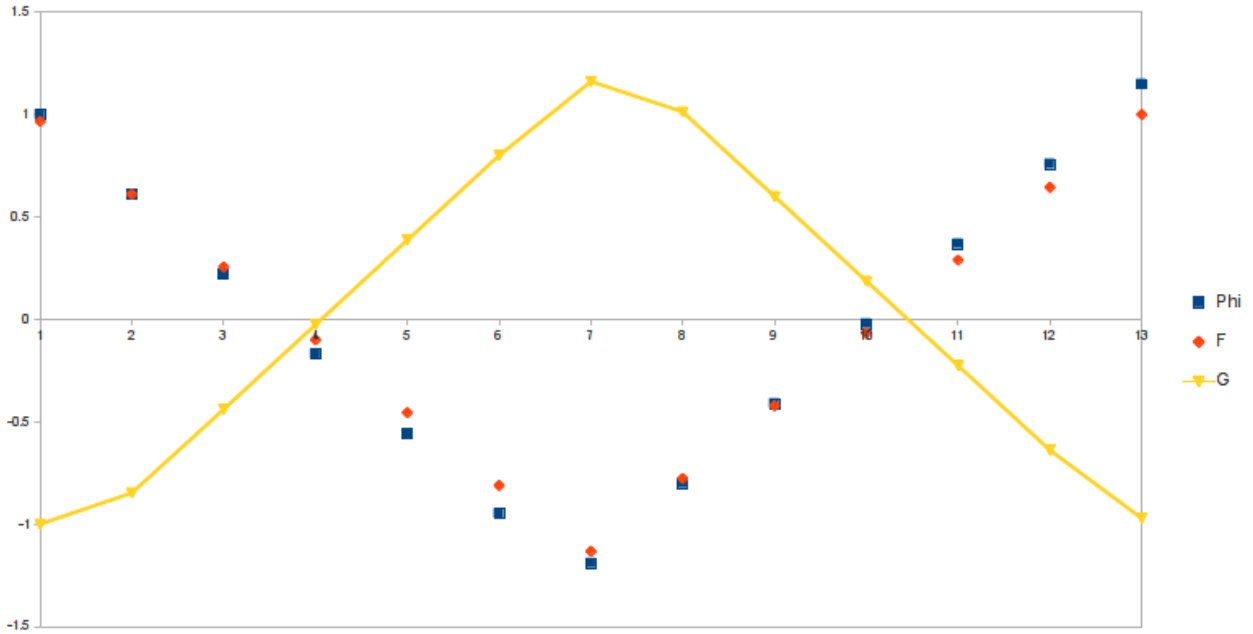
en 27 absin$_0$.....	From ♓13 to ♍27 month by month (you shall add)
28,7,30 *šá al* 13 z[ib]	28;7,30, anything beyond ♓13
dirig a-rá 1,4 DU ki	multiply by 1,4 (and) add
13 zib tab ta 27 absin	it to ♓13. From ♍27
en 13 zib 30 tab *ša al*	to ♓13 you shall add 30, anything beyond
27 absin$_0$ dirig a-rá 56,15	♍27 multiply by 56,15
DU ki 27 absin tab	(and) add it to ♍27

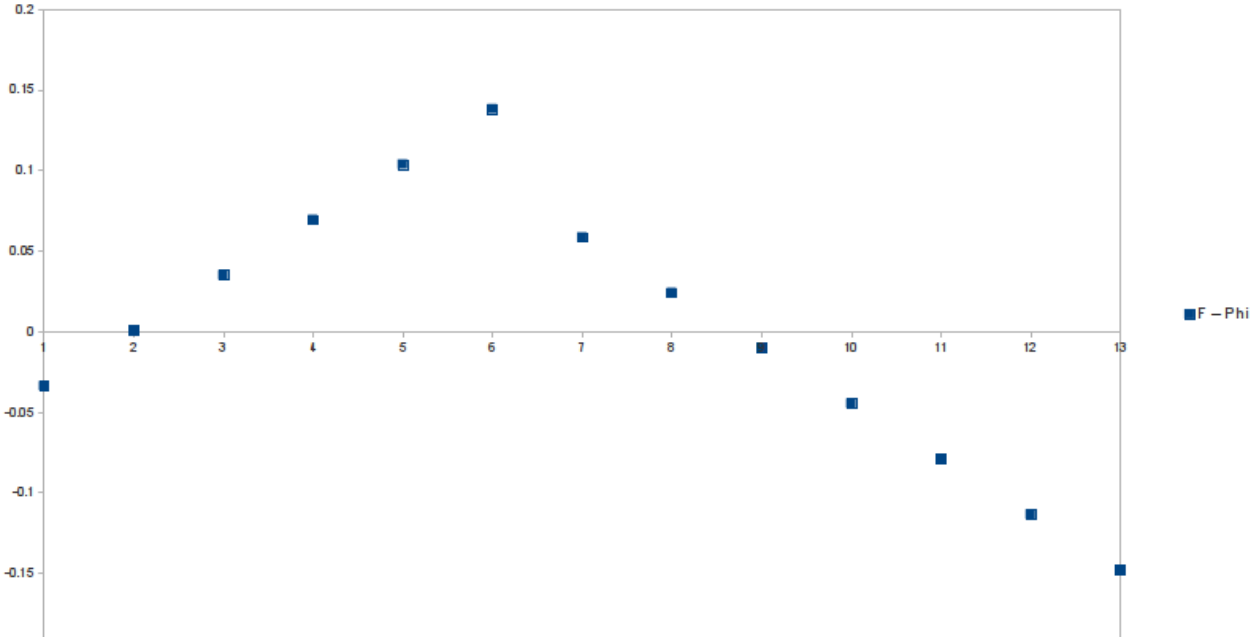
System B

No. 122 Obv I and II:

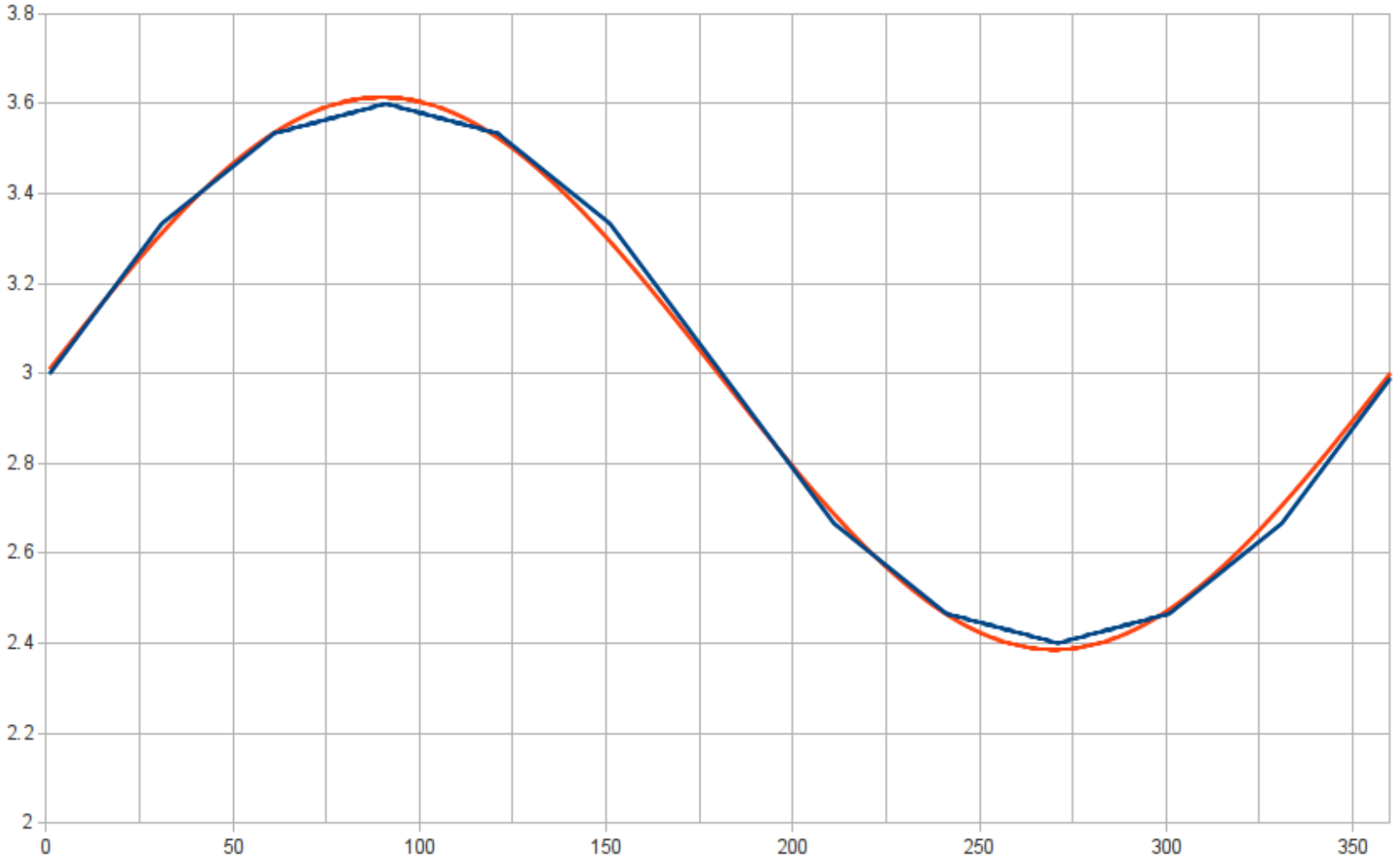
	[XII]	[29,8,3]9,18	+42, 0, 0	2,2,6,20	hun	♈	+28, 7, 30 − 30
[3,28	I	[28,50,39,]18	−18, 0, 0	[5]2,45,38	múl	♉	+28, 7, 30 − 30
	[II]	[28,3]2,39,18	−18, 0, 0	29,25,24,56	múl	♉	+28, 7, 30 − 30
	[III]	[28],14,39,18		27,40,4,14	maš	♊	+28, 7, 30 − 30
	[IV]	[2]8,24,40,2	+18, 0, 0	26,4,44,16	kušu	♋	+28, 7, 30 − 30
	[V]	[2]8,42,40,2	+18, 0, 0	24,47,24,18	a	♌	+29, 35, 45 − 30
	[VI]	29,·,40,2	+18, 0, 0	23,48,4,20	absin	♍	+30 − 30
	[VI$_2$]	29,18,40,2	+18, 0, 0	23,6,44,22	rín	♎	+30 − 30
	[VII]	[2]9,36,40,2	+18, 0, 0	22,43,24,24	gír-tab	♏	+30 − 30
	[VII]	29,54,40,2		[22,38],4,26	pa	♐	+30 − 30
	[IX]	[29],51,17,5[8]	−18, 0, 0	[22,29,22],24	maš	♑	+30 − 30
	[X]	[29],33,17,58	−18, 0, 0	[22,2,40,22	g]u	♒	+29, 24, 15 − 30
	[XI]	[2]9,15,17,58		21,17,58,20	zib-me	♓	

Velocity of the Moon





Length of daylight



Length of the month

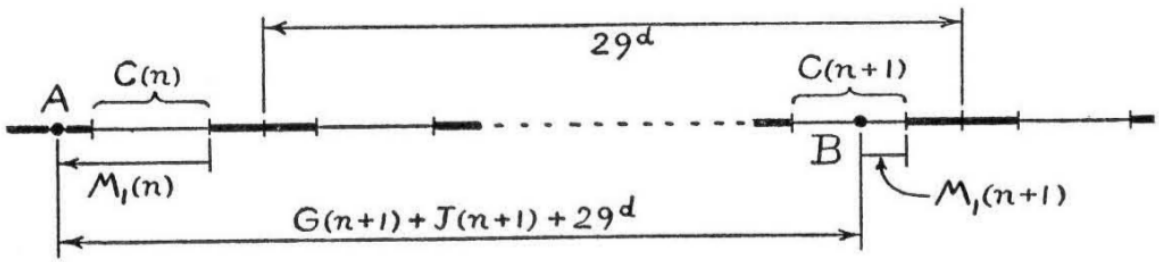


Fig. 27

Conclusion

Final remarks

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Thank You!