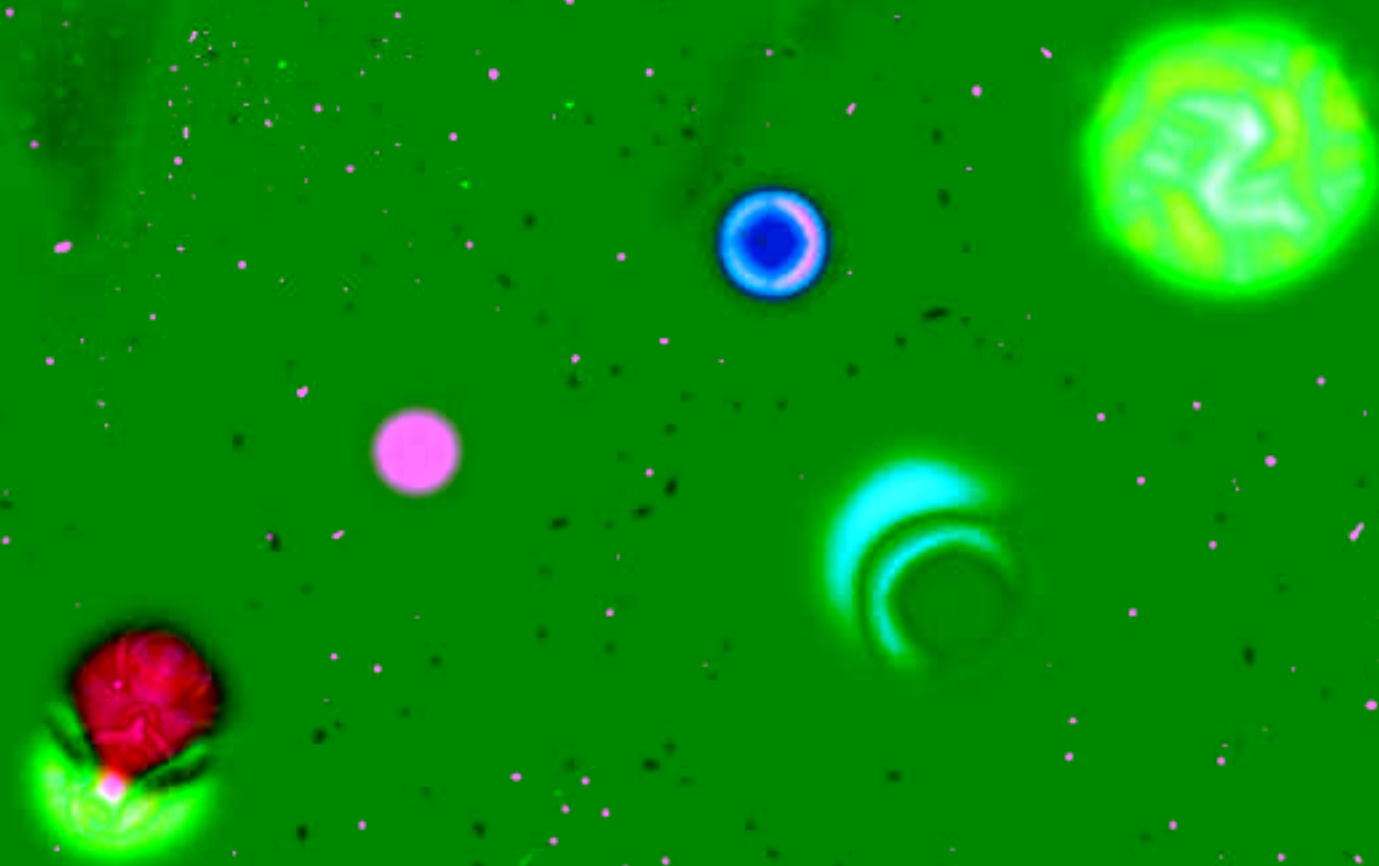


Under the Jorune sky



In girum imus nocte et consumimur igni

*A Jorune astronomicon
(C) Ugul d'Vsengrin*

A Jorune Astronomicon by Ugul d'Ysengrin

Thursday, December 31, 1998

Manual for JOMOONS program version 0.8.3

In girum imus nocte et consuminur igni.

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1. F orewords

Yes, this is written in Frenglish, a French encryption method even the most recent and powerful computers cannot hack !

Sorry for pure English readers, sorry for French only readers. French fellows speaking that very particular English learnt in French public schools should easily decrypt Frenglish !

Good luck !

1.1 Why a J orune A stronomicon ?

On earth, many things depend on moon. Tides, sowing time, plant grow, animal moods, fish spawn, bird migrations, crops, weather changes, some even say murders, depend on moon ... For many men, moon ephemeris is an everyday important matter.

Great and powerful events are moon leaded. In Mont Saint-Michel bay, during equinox full moon, tidal range can be more than fifteen meters, sea runs on sand faster than an horse, and in river Couesnon, a tidal wave, one meter high, runs upstream at fifty kilometers an hour. And I am not speaking of Amazon River tidal wave !

Earth has a moon ; Jorune has seven ! I deduct moons' ephemeris is, at least, seven, but probably forty-nine times more important on Jorune than on earth !

So, as a Sholari, I often wonder, when country toth should sow durlig and when they should harvest !

And I cannot response these questions because I do not know moon configurations.

We can find some data reading Sholari Companion calendar, but it is only for year 3493, and there isn't data for each Jorune moon. Desti has been forgotten, there is a mistake for Gobey and we can only found full moon days.

I write to Joe (Sholari list) on May 1998 for some precision about 3493-year calendar and then a discussion begin with Dave about Jorune astronomical data and related problems.

So I decided to write some lines of C to compute moon ephemeris and fix problems. I began on 1998, May the first, while I was tied down to Paris town duty all this three days week-end and I had just to wait in a sad room with " red " phones some " disaster " to occur. No disaster occurred and I could peacefully write some C.

Unfortunately, these last months, I had little time for programming. That is why this piece of code is coming so late and that is why it is not the definitive version.

With this documentation file you should have got JOMOONS.EXE version 0, release 8, fixes 3. If not, complain !

1.2 Who is Ugul d'Y sengrin

Ugul d'Ysengrin is an old Rune Quest character name, and a pen name for this work. You can write to Ugul by different means :

- write to udysengrin@europost.org
- write to Sholari list : sholari-list@eskimo.com
- write to Jorune list : jorune-l@io.com
- write a paper letter with nice stamps (or ugly ones if you haven't got nice !) to Jean-Claude Huet (it's me) 62, rue d'Aubervilliers, 75019 Paris, France.

This is a picture of me for you can recognize me if we meet !



An another assumed name could be W.E. Coyote !

1.3 Thanks

Very special thanks to Dave who enlightened my Paleolithic oil lamp with very precise responses to my dunce questions.

Thanks to Dave, Fred (Tucson, Arizona), Ted, and Joe for their support.

Thanks to Noah who helps me when I was misusing the Jorune-I list and who helps me twice when ASTRON.EXE joined file was too big.

Thanks to Fred (Rennes, France) for our fruitful exchange.

1.4 Copyrights, Warranty and Disclaimer

1.4.1. Nothing is registered, but :

Ugul d'Ysengrin is my old knight duck name, please don't misuse it, Ugul is a good duck, lawful and brave !

For the rest : " And if it was only a game ! ". This is my philosophy. I want to play and nothing else. I hope you will have fun with this work it will be helpful to your game.

As the author, I disagree with any purpose other than freely and free of charge role-playing that could be made with this work.

This being said, feel free to distribute and improve this work.

1.4.2. Warranty and disclaimer.

All this stuff is for free. There is no warranty of any kind whatever is the purpose you use it. If for some incredible and unlucky series of circumstances some great unhappiness results of this work it is not my fault and I disclaim all responsibility. For example, if your most precious character dies, for your Sholari computes a terrific moons alignment which results in horrific tides and your character can't swim, so you drink to forget before coming home, and then you come home drunk, so your wife is upset with you, leaves you and demands for divorce, it is not my fault !

1.4.3. Copyright

General Public License protects JOMOONS source code. Read COPYING file or contact Free Software Foundation if you want to know what it exactly means.

In a few words, you can use it, copy it, give it to your friend, sell it to your enemy, modify it, BUT, if you give it, sell it, modify it you have to give the program sources and manuals with the program binaries and you may not restrict the others' rights to also use, give, sell, modify it.

In a word JOMOONS belongs to everybody.

2. Some consideration about Jorune books

First, I haven't got all Jorune books...

Second, I still haven't read all those I have got...

Third, I do not always remember what I read, but :

2.1. There are some errors or some omissions in Jorune books

Omission : In 3493-year calendar, Sholari Companion, Desti full moon dates are not given. At least one of Desti full moon date is necessary to compute great moon alignment for there is no place elsewhere where dates of seven moons' alignments are given.

Error (according to Dave) : " The gaps between full moons in the 3rd edition calendar have been made equal to the periods of orbit given in 2nd and 3rd editions. Unfortunately this cannot be right. If there are four full moons of Du each year, Du has to orbit Jorune five times a year, because Jorune keeps moving round its sun between full moons. Rather than change the calendar, it seems easier to recalculate the orbits. "

According to Dave dunce pupil (me), in Dave example, Du could orbit only three times a year for four full moons, if Du orbits counterclockwise around and Jorune orbits clockwise around its Sun. And reciprocally !

Error : In 3493-year calendar, Gobey is said full on 12/1/3493 and 28/1/3493, but gap between two Gobey full moons should be 17 according to previous error. That is to say that we should consider that there was the same error confusing full moon apparent period and the period of orbit for Gobey. So Gobey full moon apparent period should be 17.

These errors should be fixed respectfully with Jorune history.

2.2. What is said in J orune books

This work will be no worth if it does not respect what was written before. I tried to keep as many things it seemed possible.

In Sholari Companion we can read :

P26 : 400-600 is the age of monster, for there were seven moons alignment ...

P27 : 2200 Moons' alignment creates enormous tidal disturbances ...

So I had to choice a Desti full moon date which could be compliant with this history ...

2.3. Some dunce mathematics

2.3.1 Full moon apparent period

I keep Sholari Companion 3493-year calendar as a reference.

In a pragmatic way we should consider that full moon apparent period and orbit period confusion error in Sholari Companion 3493-year is a good thing. It is much more symbolic to have full or new moons every weeks, months or years at the same date, than an abstract number of 2P revolution in a Galileo referential !

So number between square brackets is gap of days between two full moon, or full moon apparent period. Remember this goes against orbiting period given in 2nd and 3rd edition (3rd edition page 191).

Tra [2]

Ebba [4]

Launtra [7]

Gobey [17]

Shal [40,5]

Desti [55]

Du [81]

You can see what orbiting periods result of this choice with JOMOONS typing on DOS prompt " jomoons -data ".

2.3.2 A lignment period

BEWARE, these are dunce mathematics, enlightened Iscins (as Dave) may not agree with this !

Full moon apparent period is the gap of days between two full moons.

Assuming Tra an Ebba are aligned only when they are full, or when Tra is full and Ebba is new, see chart - 9 -, the major seven alignment is necessarily an alignment of seven full or new moons. This is reinforced by the fact that Shal and Du are in the same case, see chart - 10 -, because Shal orbits twice faster than Du as Tra orbits twice faster than Ebba. So on seven moons four can only align with Jorune when they are full or when they are new. This last case is for Ebba that can be new when Tra Shal and Du are full.

$4 \times 7 \times 17 \times 55 \times 81$ equals 2120580 days equals 6545 years which is the period for a seven moons alignment all moons on the same Jorune side (all moons are full). We don't consider Tra full moon apparent period because Tra full moon apparent period divide Ebba full moon apparent period.

But according to the very special Jorune case we have to consider that Tra, Ebba, Shal and Du align every 162 days on the same Jorune side or either one side and other side (Tra, Shal and Du moons are full, Ebba is new).

$(2 \times 81) \times (7 \times 17 \times 55)$ equals 1060290 days equals 3272.5 years which is the period for a seven moons alignment, once all moons are full, once all moons are full except Ebba that is new (dark).

Special moons' configuration	Formula	Periodicity (in days)	Periodicity (in years)
Tra, Ebba, Shal, Du are full moon	4×81	324	1
Tra, Shal, Du are full, Ebba is new	4×81	324	1
All moons full	$4 \times 7 \times 17 \times 55 \times 81$	2120580	6545
All moons are full except Ebba that is new	$4 \times 7 \times 17 \times 55 \times 81$	2120580	6545
All moons are aligned, Ebba is full or new	$2 \times 7 \times 17 \times 55 \times 81$	1060290	3272.5

Such a chart could be set for all different moons configurations but, according a moon can align with Jorune and Sun when it is full or dark and according there is seven moons, so fourteen possibility, there are too many different configurations types for such a chart could be reasonably established.

2.3. What I decided

2.3.1. J orune calendar and program days gone number

Jorune time line said the Shanthic attack occurred year 0.

I precise the Shanthic attack of colony occurred on day 1 year 0 hour 0 (1/1/0:0). That is to say Shanthic attack begun at the end of day zero or at the beginning of day one.

JOMOONS days gone number : One year later, 1/1/1:0 is the JOMOONS day 1 end (this is only for programming convenience and easy date conversion algorithm). That means that JOMOONS day one begins on 81/4/0:0 and end on 1/1/1:0. See JODATE.C source code for more details.

2.3.2. Setting a date for seven moons' alignment

I am aware it is a great honor and a great responsibility to set a date for seven moons' alignment. I sure Andrew Leker did this long before, and perhaps his setting was different. My setting may obviously be discussed. It isn't difficult to change the JOMOONS program setting and recompile.

I decide Jorune moons orbit around Jorune in the same direction than Jorune orbits around Sun. I do not decide if Jorune orbits clockwise around Sun regarding its North Pole or counterclockwise. This has to be set. I do not decide if Jorune rotates clockwise on its axis, regarding its North Pole (Sun rising west) or counterclockwise (Sun rising east). This has to be set if not already done (I found no reference to this detail !).

I have set Desti full moon on 23/1/3493, 0 hours.

This give the following seven moons' alignment, which is compliant with beginning of Age of monsters :

```
On day and hour    1/3/418  0, 7 moons are aligned with Jorune and Sun
:
Tra, Ebba, Launtra, Gobey, Shal, Desti, Du,
Jorune orbit angle around Sun is : 180
Moons' orbit angles around Jorune are :
Moon :      Tra      Ebba Launtra  Gobey      Shal      Desti      Du
Angle :      180      180      180      180      180      180      180
```

You can check this by yourself with JOMOONS, type on dos prompt :

" jomoons -majorline 0:7:1 -date 1/3/418 -date 1/3/418 ".

And this give for 3493 year beginning the following results that are compliant with Sholari Companion 3493-year calendar except for Gobey second full moon which occurs on 29 and not 28. But it was obviously an error on 3493-year calendar :

```
Moons prediction these days,
Today : Jorune day 1131409.0 is the 1 St of Crith year 3493, 0 hours

Moon (Per.) Last Full HH Next full HH Last Dark HH Next dark HH
Tra ( 2.0)  1/1/3493  0   3/1/3493  0   81/4/3492  0   2/1/3493  0
Ebba ( 4.0)  80/4/3492  0   3/1/3493  0   1/1/3493  0   5/1/3493  0
Launtra ( 7.0)  79/4/3492  0   5/1/3493  0   75/4/3492 12   1/1/3493 12
Gobey (17.0)  76/4/3492  0   12/1/3493 0   67/4/3492 12   3/1/3493 12
Shal (40.5)  1/1/3493  0   41/1/3493 12  61/4/3492 18   21/1/3493  6
Desti (55.0)  49/4/3492  0   23/1/3493 0   76/4/3492 12   50/1/3493 12
Du (81.0)   1/1/3493  0   1/2/3493  0   41/4/3492 12   41/1/3493 12
```

You can check this by yourself with JOMOONS, type on dos prompt :

" jomoons -spot -date 1/1/3493 -literal ".

This setting give dates for seven moons' almost alignment in years 1186 and 1245. This is compliant with Jorune time line and great 1200 tide disturbances.

3. J omoons comprehension

3.1. J omoons manual

3.1.1. General syntax

" jomoons command [mandatory argument (optional argument)] " ...

Command is a string beginning with a -. Except for "jomoons ?" which is different from " jomoons -help ". ? give list of available commands, -help display " jomoons.man " file.

When [argument] is shown between square brackets after command in this manual this argument is mandatory. On command line type argument without square brackets just after its command.

When (argument) is show between parenthesis after command letter, eventually inside square brackets [mandatory argument(optional argument)] argument is optional. On command line type argument without parenthesis just after its command and, if there's one, mandatory argument.

For example : type " jomoons -date 1/3/418 " [1/3/418 is mandatory] or type " jomoons -date 1/3/418:12 " (:12 is optional).

There is no order for commands. There is order for arguments. An argument should be just after its relating command.

Without any command : author, copyright, version and settings information.

3.1.2. L ist of commands

? : Display list of available commands.

-argument : Display your options, commands and arguments.

-calendar : Display moons calendar for 21 days since date given with -date [date(:hour)] or -date [number of days gone.(fraction of days)]. Without use of -literal commands display Jorune orbit angle and moons configuration angles. With use of -literal commands display moons configuration in a literal manner : FM is for Full Moon, DM is for Dark (i.e. new) Moon, FQ is for First Quarter, LQ is for Last Quarter, bg is for beginning, rn right now, fn finishing.

-clock : Display beginning and ending time of JOMOONS.

-copyright : Display copyright banner. Says you agree !

-data : Display astronomical data on Jorune and its moons.

-date [number(.fraction day)] : Give days and fraction day gone since 81/4/0:00 to program for use with other commands.

-date [day/month/year(:hour)] : Give date and hour to program for use with other commands. -date [date(:hour)] or -date [number of days gone(.fraction of day)] are equivalent, only argument syntax is different.

-eclipse : Not implemented until now.

-ephemeris [step] : Display moons calendar between two dates each [step] hours. Without use of -literal commands display Jorune orbit angle and moons configuration angles. With use of -literal commands display moons configuration in a literal manner : FM is for Full Moon, DM is for Dark (i.e. new) Moon, FQ is for First Quarter, LQ is for Last Quarter, bg is for beginning, rn right now, fn finishing.

-gpl : Display General Public License which rules copyright for this program.

-help : Display this manual.

-literal : With other commands display results in a literal manner. Try -literal with -calendar, -ephemeris, -spot, -translate.

-majorline [angle:linesize:step] : Display Sun-Jorune-moons' alignment in an angle sector of [angle] degrees, for a line of moons of [linesize] between two dates. There is a line computation every [step] Jorune hours. With -silent command only date, line size and planet orbit angles are displayed.

-minorline [angle:linesize:step] : Display Jorune-moons' alignments in an angle sector of [angle] degrees, for a line of moons of [linesize] between two dates. There is a line computation every [step] Jorune hours. With -silent command only date, line size and planet orbit angles are displayed.

-pipe : Suppresses computation progressing displays or prompts for user answer. This command is used when redirecting standard output in a file.

-silent : With others commands display results in a silent manner. Try -silent with -majorline and -minorline commands.

-spot : Spot moons configuration at date given with -date [date] or -date [number of days gone(.fraction of day)].

-tide : Not implemented until now.

-translate : Translate date into days gone number and reciprocally.

-verbose : With others commands display results in a verbose manner. Not used with any other commands until now.

-warranty : Usual business, say there is no warranty of any king !

-whatnext : What's up Doc ?

3.1.3. J omoons usage examples :

" jomoons -date 1/3/418 -literal -translate " :

Translate the 1/3/418 date in a literal date and show number of days gone since 81/4/0 at this date.

" jomoons -date 1/3/418 -spot " :

Spot what was happening at this date. As you will see, it is the great alignment of Jorune Sun, Jorune and its seven moons that started Age of Monsters. Try -spot with -literal command.

" jomoons -calendar -date 1/1/3493 -literal " :

Give a moons' configuration chart for 21 days since 1/1/3493. You will see it is compliant with Sholari Companion calendar. Without -literal

command `-calendar` give a chart with Jorune orbit angle and moons configuration angles.

```
"jomoons -ephemeris 1 -date 1/1/3492:12 -date 2/1/3492:24 -literal" :
```

Give a moons' configuration chart for 36 hours between 1/1/3492:12 and 2/1/3492:24. Without `-literal` command `-calendar` give a chart with Jorune orbit angle and moons configuration angles.

```
"jomoons -majorline 0:7:1 -date 1/1/418 -date 1/1/419 " :
```

Search moons alignment with Jorune and Sun with in an sector of 0 degrees (it is an exact line) with a computation each hour for 7 moons aligned between 1/1/418 and 1/1/419. Try `-majorline` with `-silent` command.

```
"jomoons -majorline 0:7:1 -date 1/1/418 -date 1/1/419 -pipe >align.txt" :
```

Is the same than `"jomoons -majorline 0:7:1 -date 1/1/418 -date 1/1/419"` but the results is in file `align.txt`. For redirect standard output in a file you should use the `-pipe` command because sometimes `jomoons` prompt user or `jomoons` display computation progressing information which shouldn't be redirected.

```
"jomoons -minorline 6:4:1 -date 1/1/3493 -date 1/1/3494 " :
```

Search for moons alignment (no matter if moons' line is the same than Jorune-Sun line) in an angle of 6 degrees for at least 4 moons aligned each hour between for all 3493 year. As `-minorline` command search for more lines than `-majorline` command it is slower.

3.1.4. Computing time

On an old 386DX33 `jomoons` is very slow. Computing line with a step of one hour it could take one second a day, five minutes a year, one hour 12 year, one day 288 years, etc.

On a 586Pro/300Mhz/128MoRam `jomoons` is much faster but still slow. It take fifty seconds to compute alignment for a century with `-pipe` command (beware progressing display slows computation speed) and with a step of one hours. So it will take 1 hour to compute alignment for 3 thousand and 6 centuries with a step of one hour.

When progressing display is on (no `-pipe` command) you can stop `jomoons` with usual `Ctrl+C`. Be careful no entering other characters before `Ctrl+C` because `jomoons` do not flush `stdin`.

You can estimate computation duration using `-clock` command for small gaps between two dates and then compute the duration for a big gap !

3.2. Moons configuration chart

Moon configuration depends on moon configuration angle. Moon configuration is ((moon orbit angle around Jorune) minus (Jorune orbit angle around Sun)) modulo 2 P.

$$\text{Config.angle} = (\text{Moon.orbit.angle} - \text{Jorune.orbit.angle}) \% 2 P$$

The table below gives moon configurations and configuration trends depending on configuration angle values.

Configuration Angle	Moon configuration	Configuration trend
135<=CA<165	New (dark) moon	Beginning
165<=CA<195	New (dark) moon	Right now
195<=CA<225	New (dark) moon	Finishing
225<=CA<255	First quarter	Beginning
255<=CA<285	First quarter	Right now
285<=CA<315	First quarter	Finishing
315<=CA<345	Full moon	Beginning
CA>=345 / CA<15	Full moon	Right now
15<=CA<45	Full moon	Finishing
45<=CA<75	Last quarter	Beginning
75<=CA<105	Last quarter	Right now
105<=CA<135	Last quarter	Finishing

You can also refer to graphic chart - 5 - at the chart section of this document.

For internal JOMOONS comprehension see `orbit_moons_once()` function in JOMOONS.C.

Using `-calendar` command of JOMOONS abbreviations are set like that : New (dark) Moon DM, First Quarter FQ, Full Moon FM, Last Quarter LQ, Beginning bg, Right Now rn, Finishing fn.

For display convenience on a DOS screen JOMOONS `-calendar` computes moon configurations only for 21 days, beginning at date argument you give with `-date` command.

Example : `JOMOONS -calendar -date 1/1/3493`

3.3. J omoons program sources

JOMOONS.C is main function. It rules arguments and calls others functions.

JOINIT.C is module for initializing JOMOONS structure. BEWARE it is in this module, with `init_jomoons_once()` function particularly, that MAGIC NUMBERS (like `jo.moon[DESTI].initfull`) are set. `Datamoon()` function display the results of such an initialization.

JOORBIT.C is module for orbiting Jorune and its moons system to a particular day and display results with `-calendar`, `-ephemeris` and `-spot` functions.

JODATE.C is module for date translating and date formatting.

JOLINE.C is module for lines computing. Thus most of lines computing functions are still in JOMOONS.C for I had no time to fix this.

JOTOOLS.C provide a more function to display JOMOONS.MAN file and COPYING file and clock function. BEWARE these two functions depend on `<CONIO.H>` and `<DOS.H>` library which are not portable on Unix platform.

JOMATH.C provides some particular mathematics' needs especially for rounding and modulo double float angles into integer angles.

JOMOONS.H is library file for JOMOONS.

4. What is coming next

4.1. New features

I hope I can write soon new features as computing eclipse, displaying a tidal chart, display an isho weather prediction chart.

4.2. Java portage and graphical user interface

Java is easily portable so I will be worth taking time to write a graphical user interface and a new function to display static or even dynamic views of Jorune sky. It could run standalone on your computer or why not be a Web page with a client / server use.

Obviously we should keep an old DOS like program but I won't take time for a GUI on DOS !

4.3. What should be set before these new features

4.3.1. In order to fix what is already done :

We should decide if we admit that major moons' alignment was on Mullin the First Year 418 at 00 hour, i.e. 1/3/418:0. As it is compliant with Jorune time line and Sholari Companion calendar I propose we say yes !

We should decide if Jorune orbits Sun clockwise or counterclockwise. I have already set that all moons orbit around Jorune in the same direction than Jorune orbits around Sun. If some of you disagree, argue and I propose a Web vote if needed.

I precise Jorune and its moons orbiting in the same direction results in more orbiting speed to be compliant with apparent full period and normally, (Dave will perhaps confirm this) shorter minor alignment period. Whatever we decide major alignments are fixed by apparent full moon periods of Sholari Companion calendar. And whatever we decide it should not be too difficult to change JOMOONS for such settings.

4.3.2. In order to compute eclipse :

We should decide for moon sizes, Sun size (Jorune is earth sized), moons orbiting nodes speeds or periods and directions. I propose I set some code with setting of mine, then see what results of this, and then we argue and Web vote if needed.

But we should already be aware that is Launtra case, as Launtra orbiting plane is ecliptic plane all points of Launtra orbit are orbiting nodes and we will get a full Sun eclipse every seven days on Launtra new moon and a full Launtra eclipse on Launtra full moon.

We should also consider that there could also happen moons's eclipses on other days that full moon for a moon could go through the

umbra cone of another moon. I will probably not compute this case for I already do not compute such lines (in fact planes) of Sun and moons.

4.3.3. In order to view an animated view of Jorune sky :

We should decide if Jorune rotates on its axis clockwise or counterclockwise regarding its north pole. If Jorune rotates clockwise regarding its north pole Sun rise West on morning !

4.3.4. In order to compute a tidal chart :

Nothing is needed because tides are complex phenomenon and chart could only be a simple one giving a strength coefficient and a tidal range for moons' configuration.

4.3.5 In order to compute an I sho weather chart :

A clear framework for moons' influence on I sho weather should be set. MIB asks for that. I ask too !

5. Bugs reports

5.1 Of course there are bugs

5.1.1. Some have been corrected since previous versions

02/12/1998

1. float is not enough precision for date > 3750. Daysgone number is now a double float.

2. exit on error does not work because error is reset within each verify_arguments call and is tested only at the end. We should have an allerrors variable. It's done !

3. There is a lot of rounding bugs for I often round transtyping data types.

27/12/1998

1. -date does not work any more with date < 53/1/1

2. some rounding bugs were coming from confusion between daysgone and daysinyear in initorbit initialization. It is corrected.

3. some rounding bugs were coming from transtyping. MODULO() function suppresses some.

27/12/1998 30/12/1998

All ugly written lines were pretty written with pointers, structures, nice variable names and nice function names. JOMOONS is now more readable and more bug resistant.

30/12/1998

1. jodate_sync() should be called before orbit_moons_once()

2. jorune.orbitangle had better being computed with modulo(daysgone*orbitaday)

31/12/1998

1. `jodate_sync()` hour wasn't correctly set because of rounding problems, we could have twice the same hour in -calendar and -ephemeris display. Two fix, call JOMATH.C function `round()` and include `<MATH.H>` in "jomoons.h" for `floor()` and `ceil()` functions with double precision.

5.1.2. Some are still there !

But I don't see any. Is that wonderful !

5.2. Please report bugs

Please report all bugs you will find giving the exact command and arguments you give on DOS prompt and saying what was wrong or unexpected in result. This is the only way I know to really improve a program.

This is also worth for manuals, "jomoons.man" file and this file ("jomoons.pdf"). There are some reasoning errors, and there is plenty of keyboard stroke errors and spelling or grammars mistakes. Please tell it. Perhaps one days "jomoons.man" and "jomoons.pdf" will be in English !

6. Charts that might help for my dunce fellows !

6.1. Chart - 1 -

General view of Jorune and its moons orbiting system.

6.2. Chart - 2 -

Try to explain graphically why there is one **2P** revolution more than full moons a year !

6.3. Chart - 3 -

Show Du moons configuration along the year.

6.4. Chart - 4 -

Explain JOMOONS notions of orbiting and configuration angles.

6.5. Chart - 5 -

Relate configuration angles and moons configurations.

6.6. Chart - 6 -

Show what is a major line.

6.7. Chart - 7 -

Show what is a minor line.

6.8. Chart - 8 -

Explain effects of angle argument in `-majorline` or `-minorline` command.

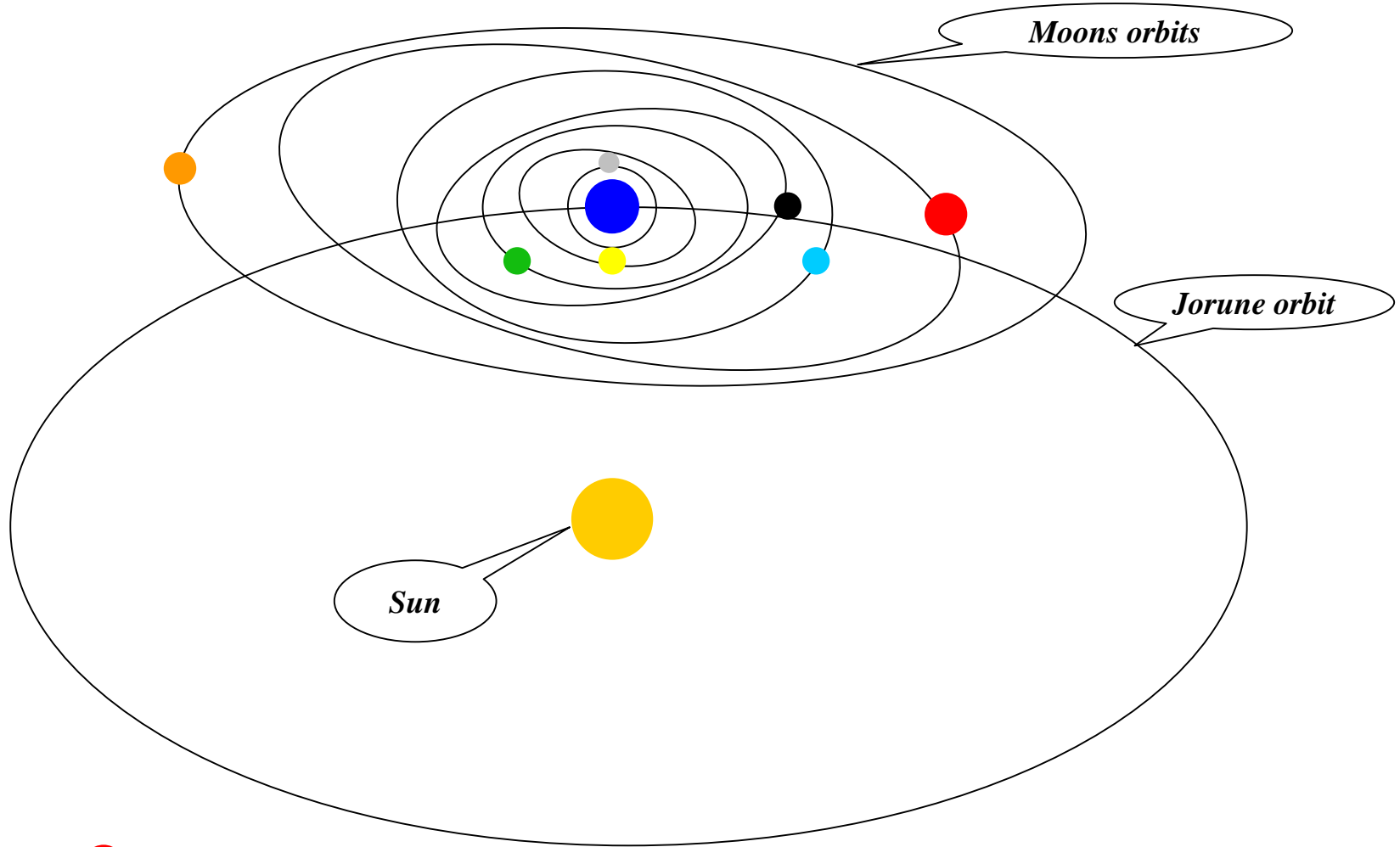
6.9. Chart - 9 -

Try to explain why Tra and Ebba align only when Tra is full and Ebba is full or new.

6.10. Chart - 10 -

Try to explain Tra, Ebba, Shal and Du lines.

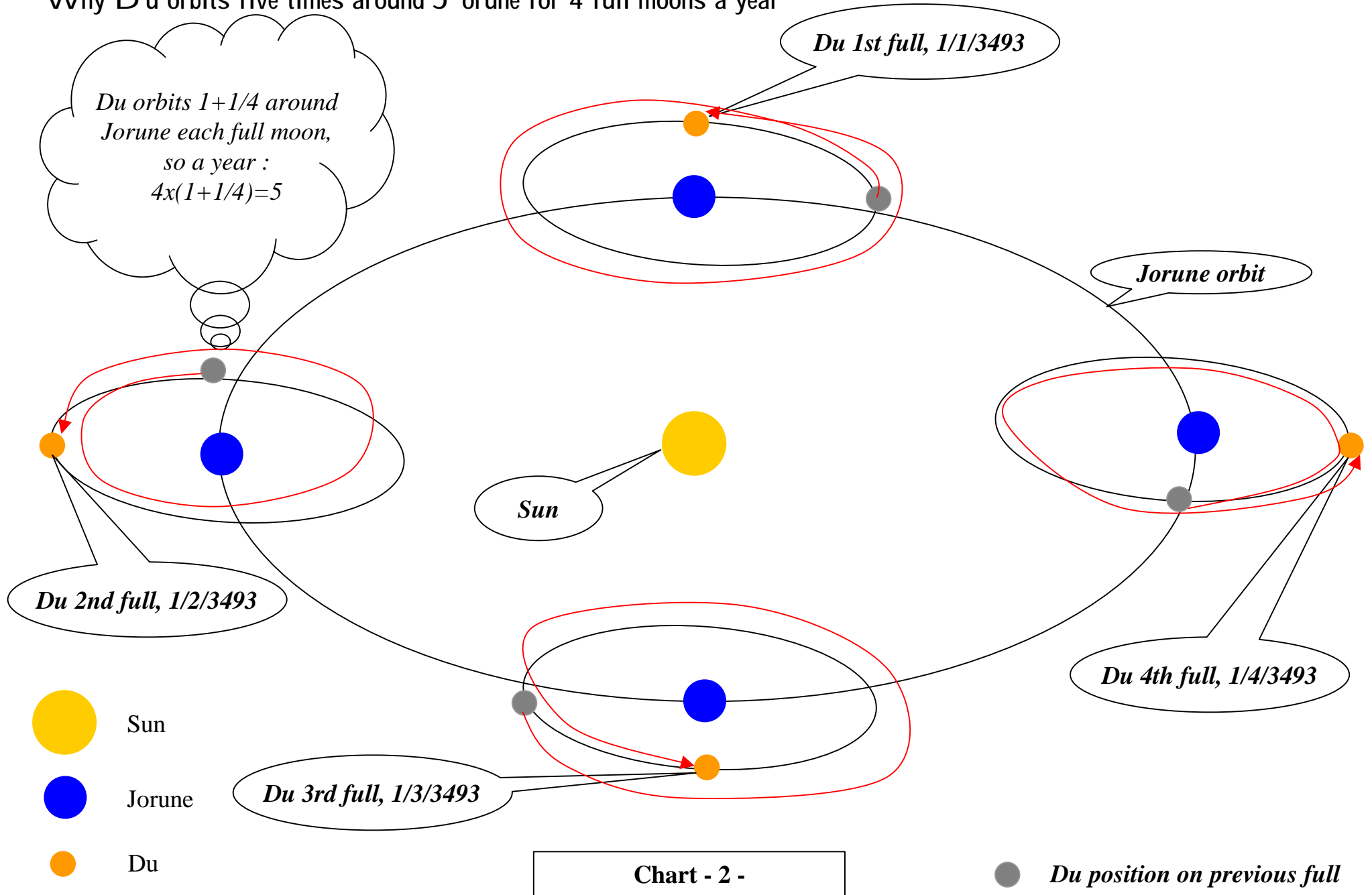
Sun, J orune and its moons orbiting system



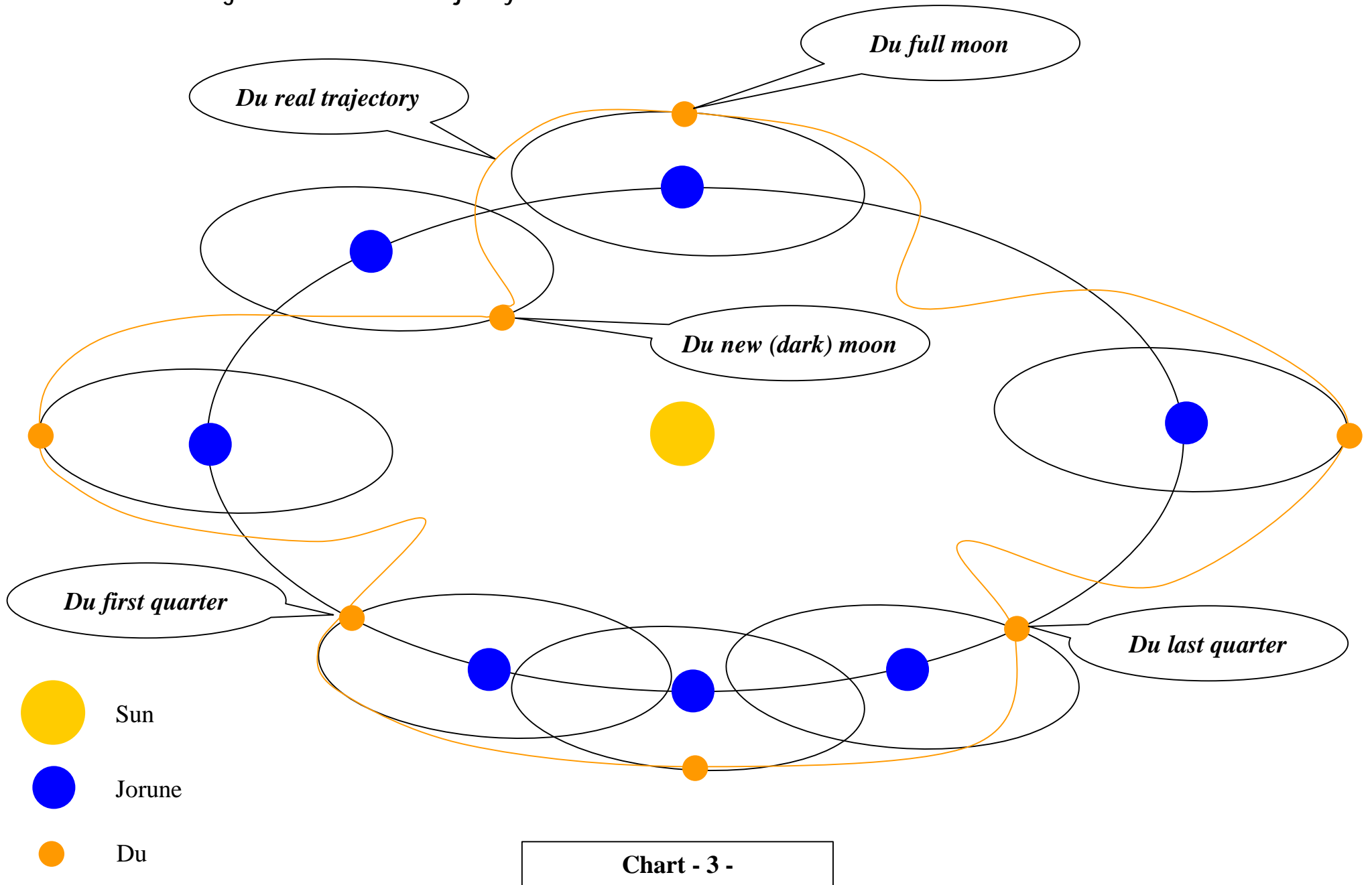
- | | | | | | | | |
|---|--------|---|---------|---|-------|---|------|
|  | Sun |  | Desti |  | Gobey | | |
|  | Jorune |  | Launtra |  | Du |  | Ebba |
|  | Tra |  | Shal | | | | |

Chart - 1 -

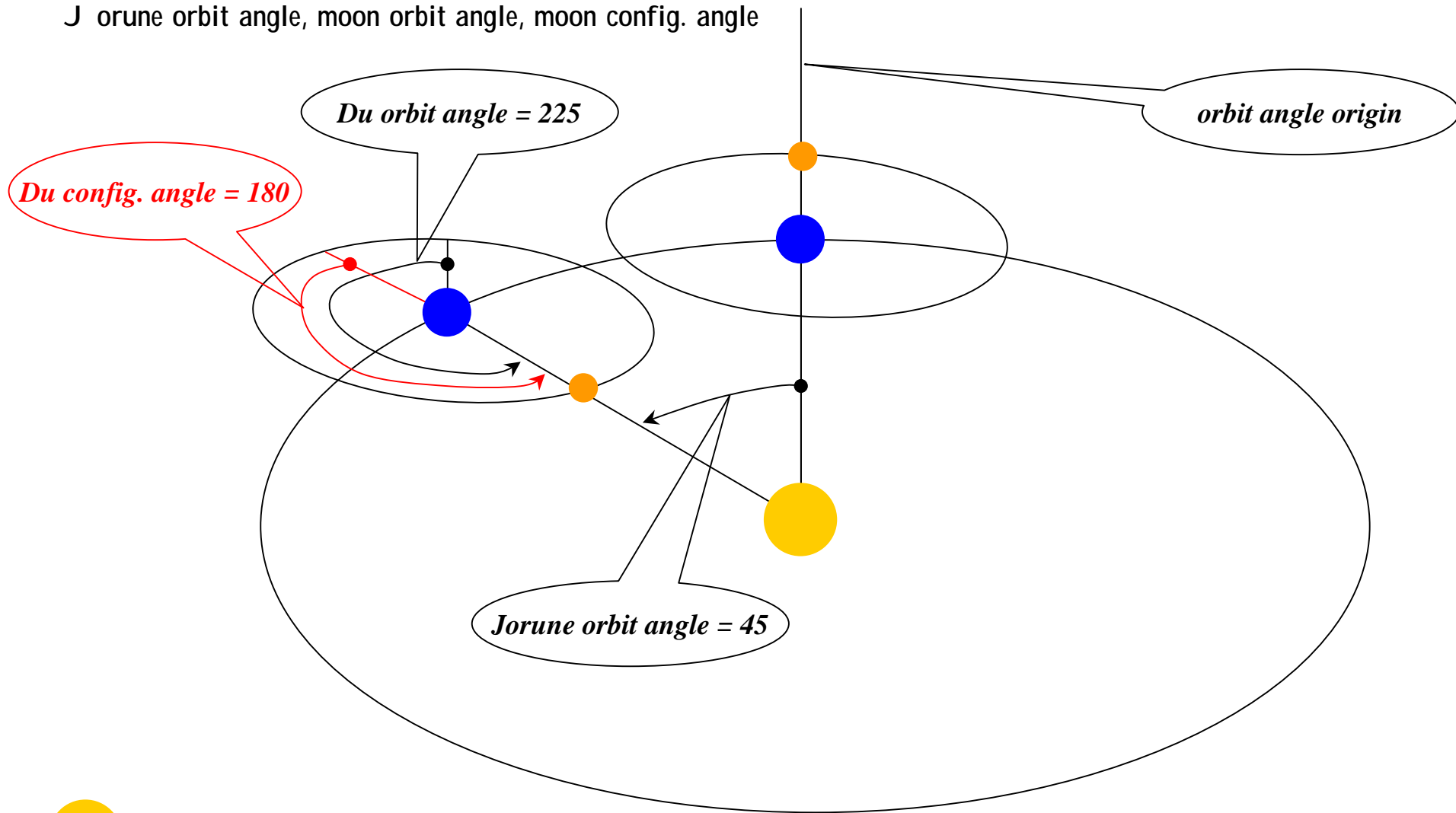
Why Du orbits five times around Jorune for 4 full moons a year



D u Moon configurations and real trajectory



J orune orbit angle, moon orbit angle, moon config. angle



Du config. angle = 180

Du orbit angle = 225

orbit angle origin

Jorune orbit angle = 45



Sun



Jorune

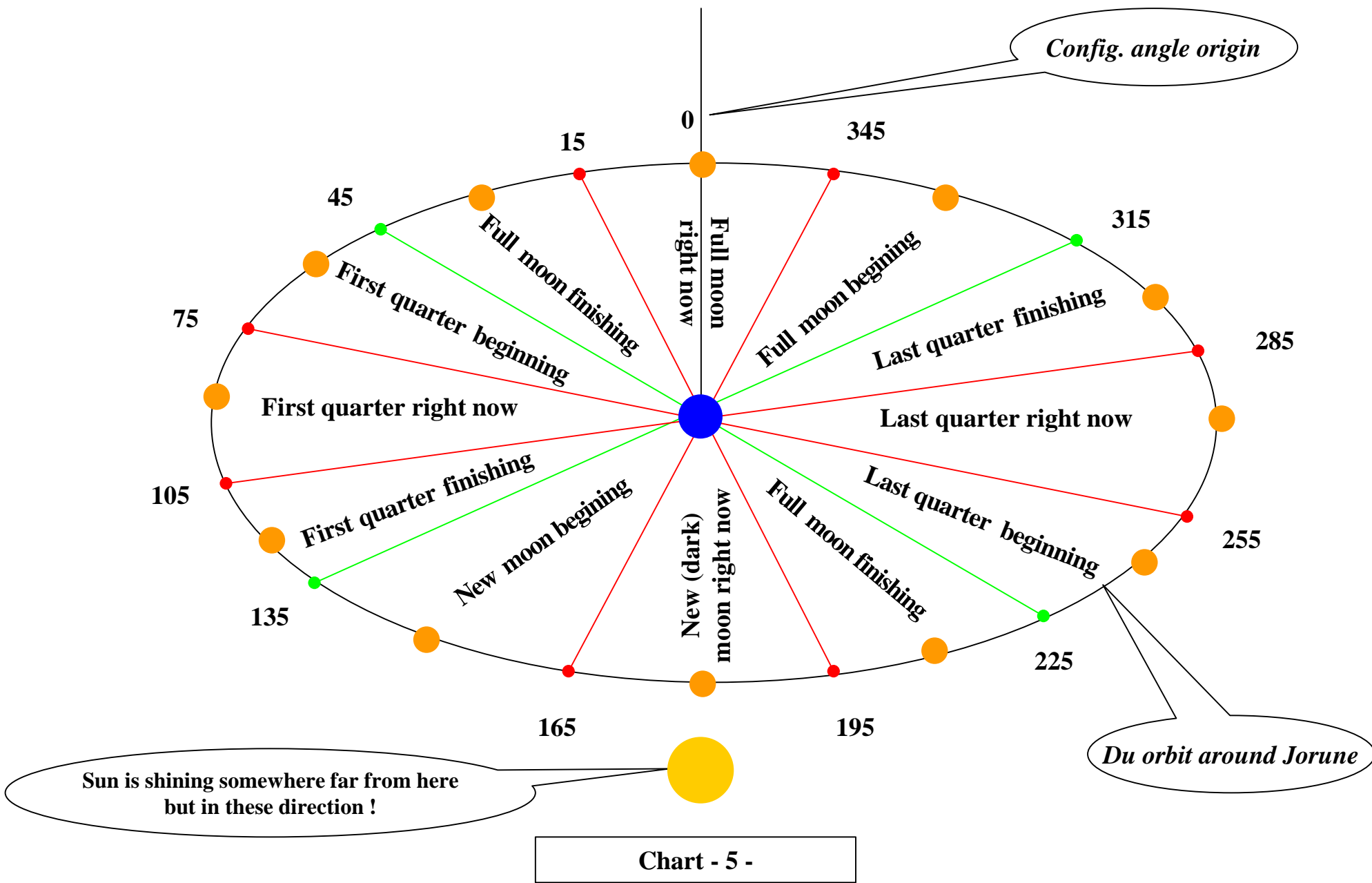


Du

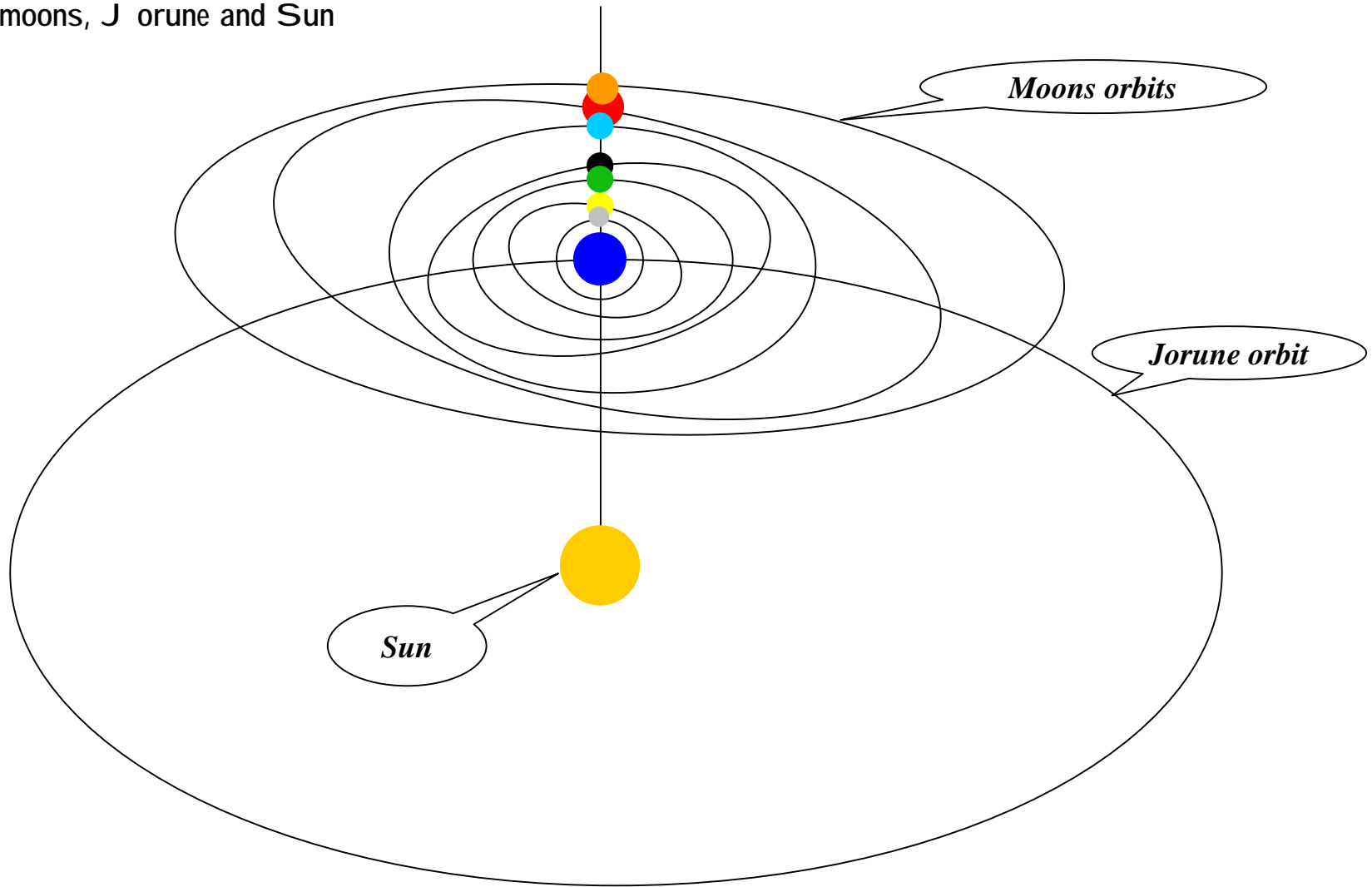
Config. Angle = (Moon orbit angle - Jorune orbit angle) [2?]

Chart - 4 -

Moon configuration depending on moon configuration angle



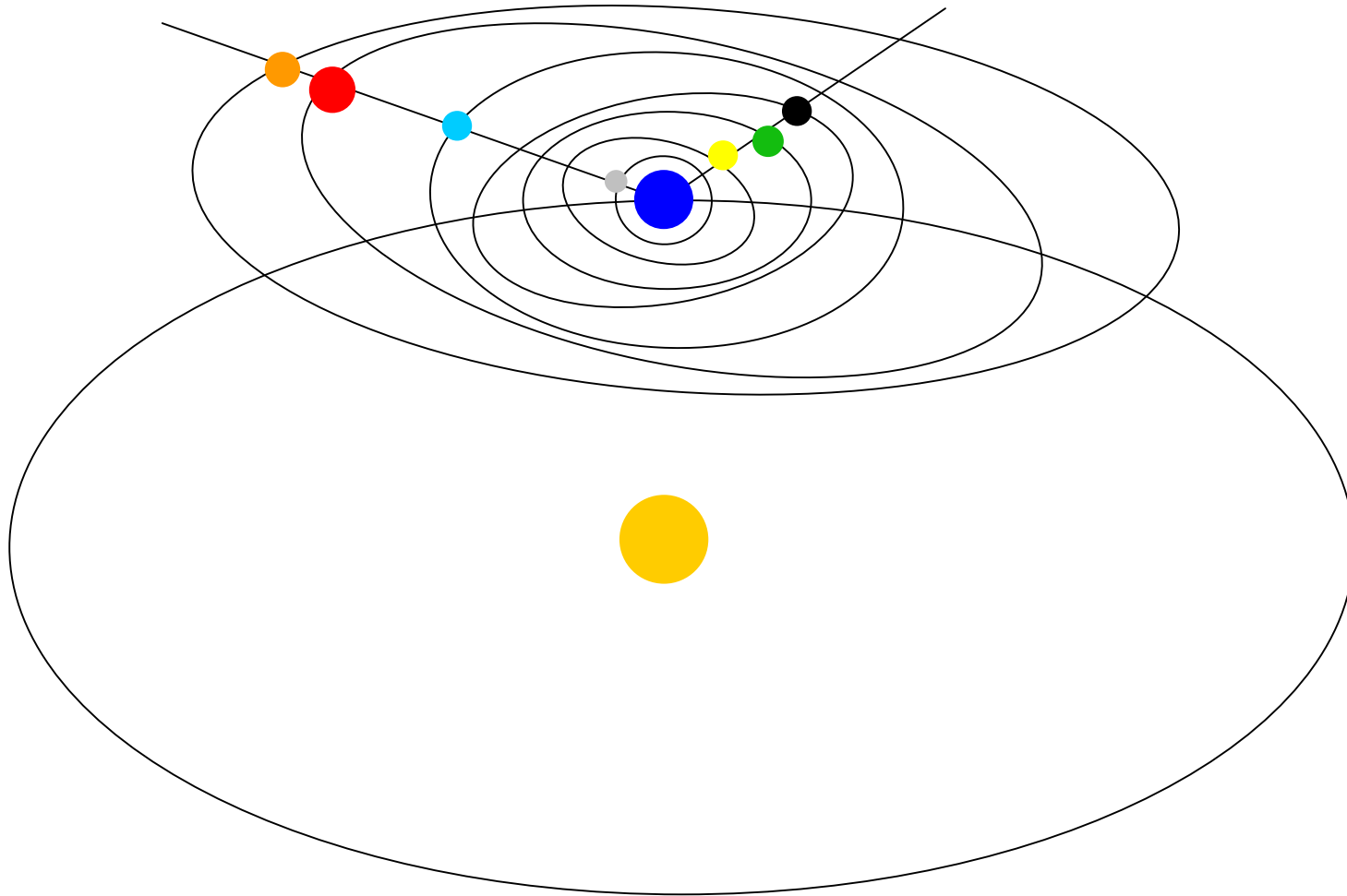
Major line of moons, J orune and Sun



Major lines are lines of moons passing through Jorune center and Sun center.

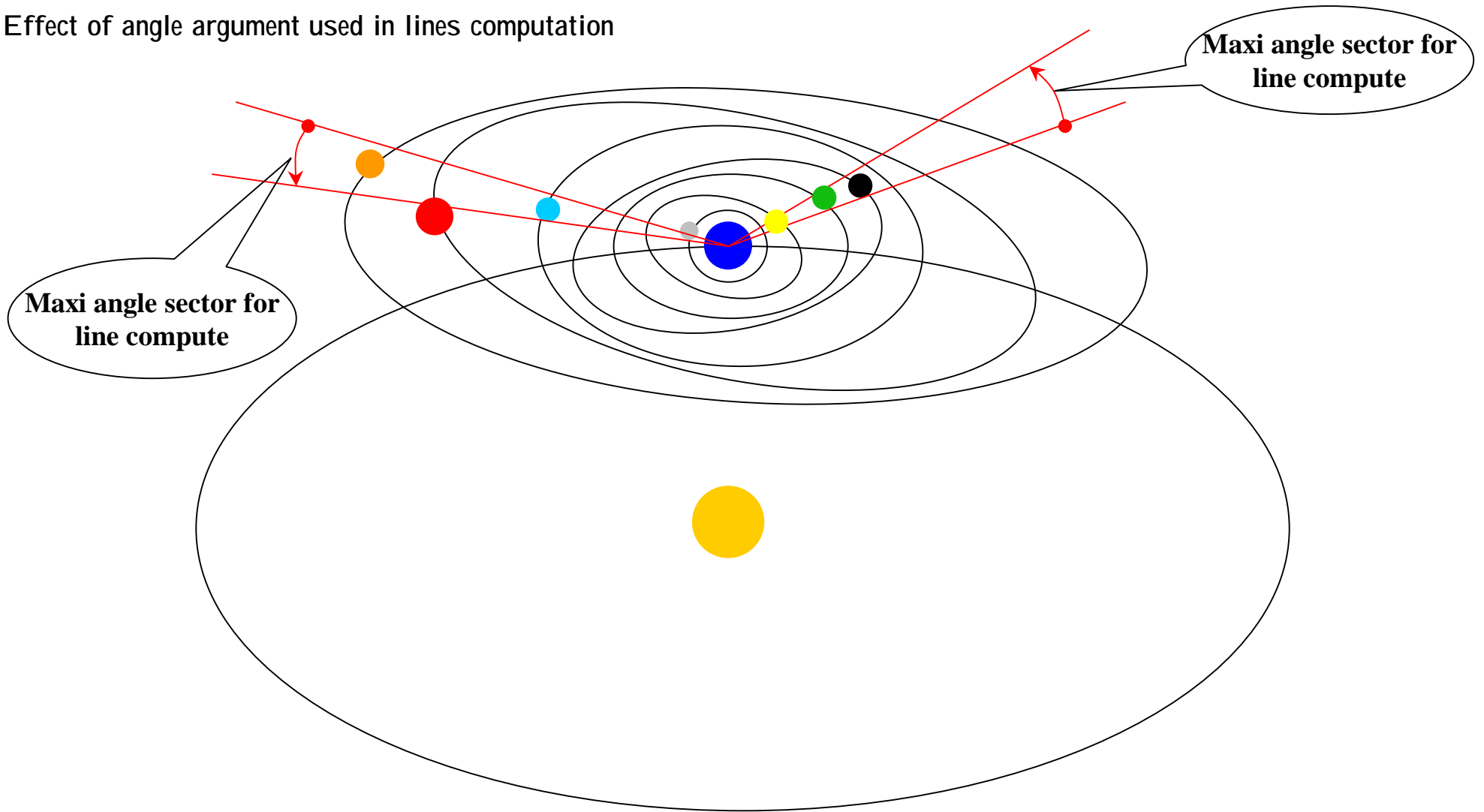
Chart - 6 -

Minor lines of moons



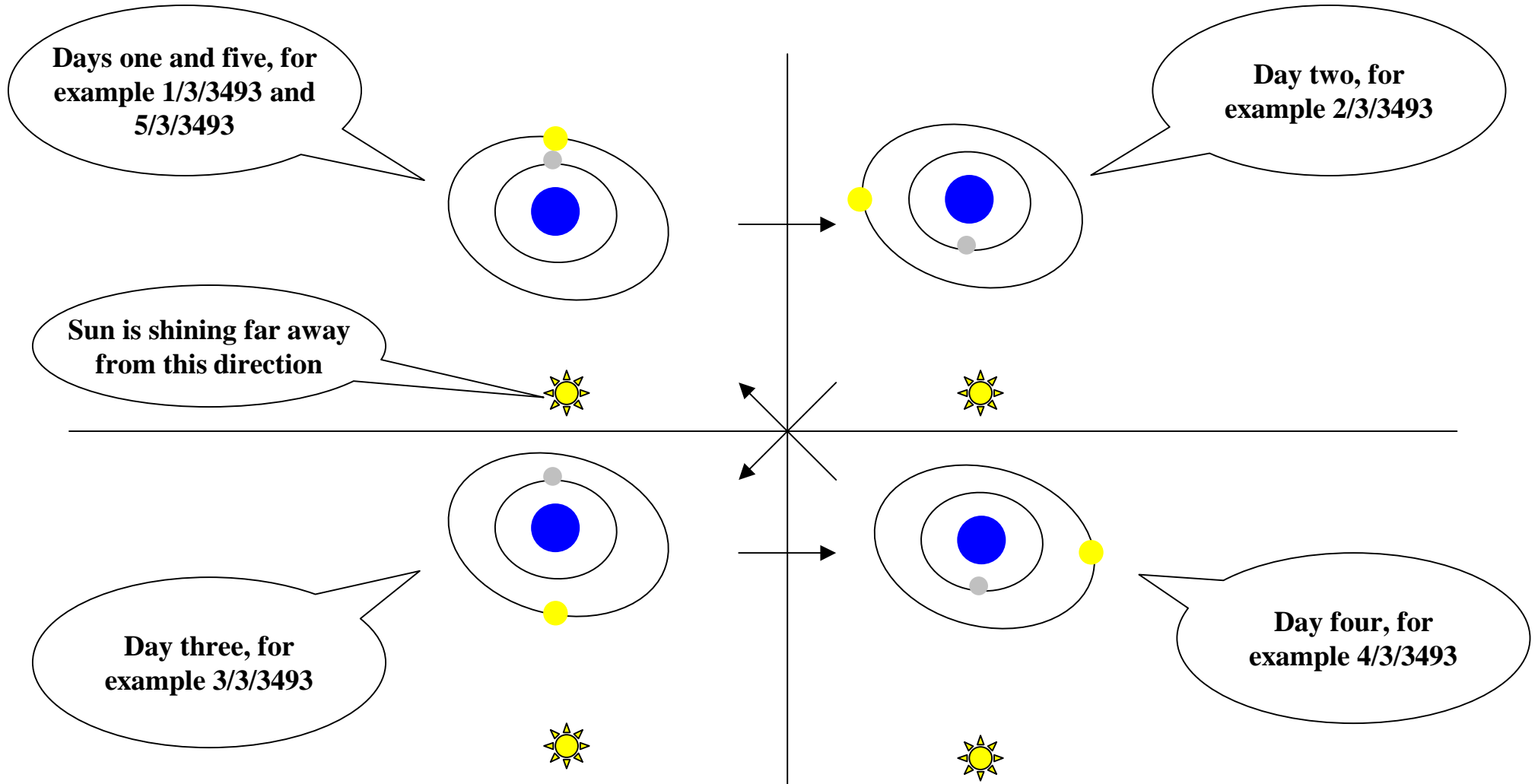
Minor lines are lines of moons passing through Jorune center but not Sun center. There is a third kind of lines of moons that do not pass through, neither Jorune center neither Sun center. JOMOONS 0.7.7 does not compute this third kind.

Effect of angle argument used in lines computation



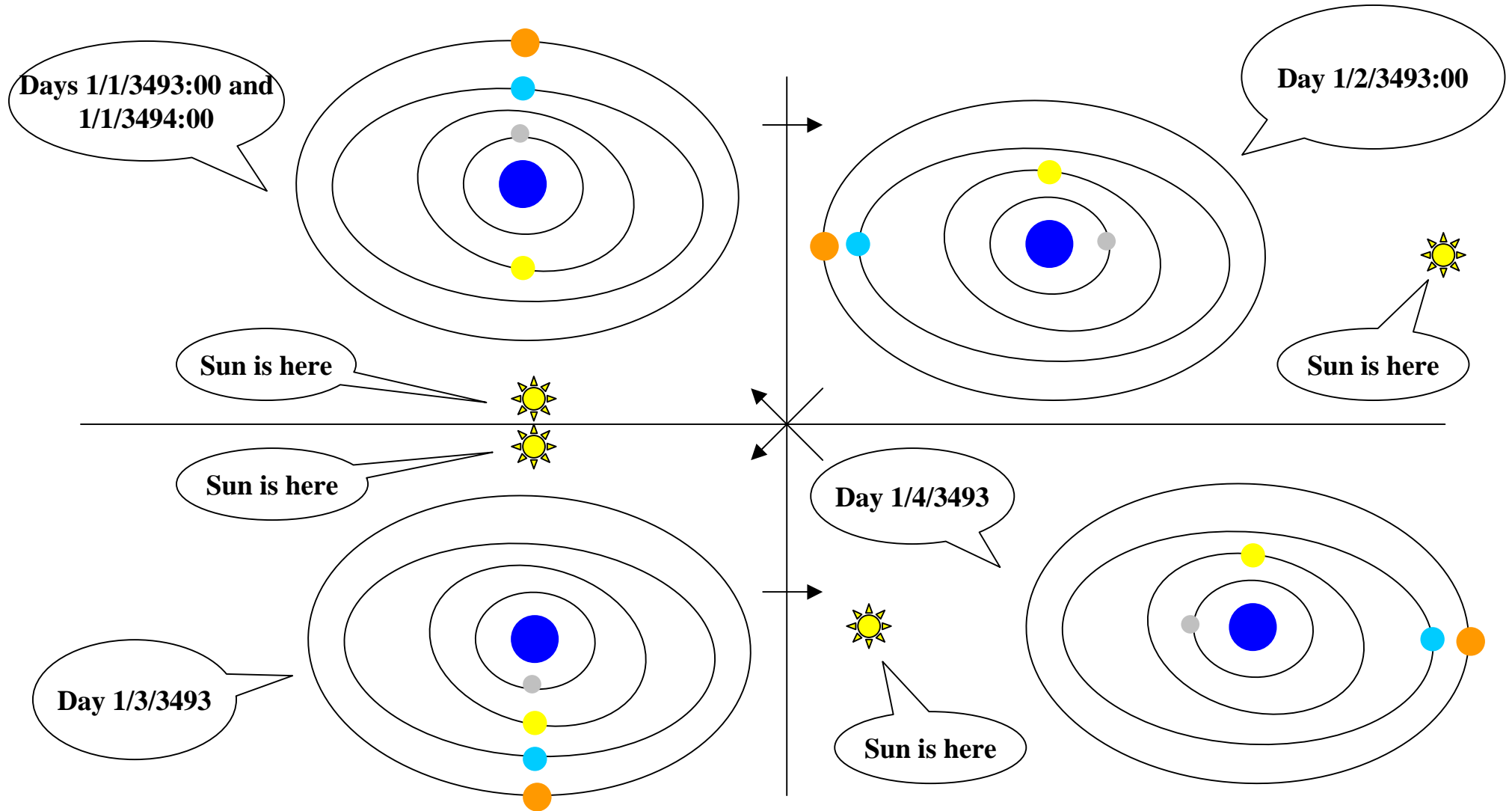
Line on right of chart will be displayed and line on left of chart won't. This is the effect of angle given as argument in first member of -majorline and -minorline commands argument : [angle:linesize:step] .

Dunce mathematics chart that tries to explain why Tra and Ebba aligned only with full or new configurations



As Tra orbits around Jorune twice faster than Ebba, Tra catch again Ebba every four days. Tra and Ebba are aligned with Jorune only when they are full or when Tra is full and Ebba is new.

D unce mathematics chart that tries to explain D u, Shal, Ebba, Tra lines cycle



Shal very special full moon apparent period of 40,5 days explains why Shal and Ebba are neither new at the same time.

7. Frequently Asked Questions

Why " In girum imus nocte et consumimur igni " ? It is quite a Latin palindrome that means : " We enter in the circle at night and fire consumes us ". I found it was perfect thinking of moons' circles in an isho burning night sky.

8. Conclusion

That's it again !

I hope this manual is better than 0.7.7 one or at least less bad !