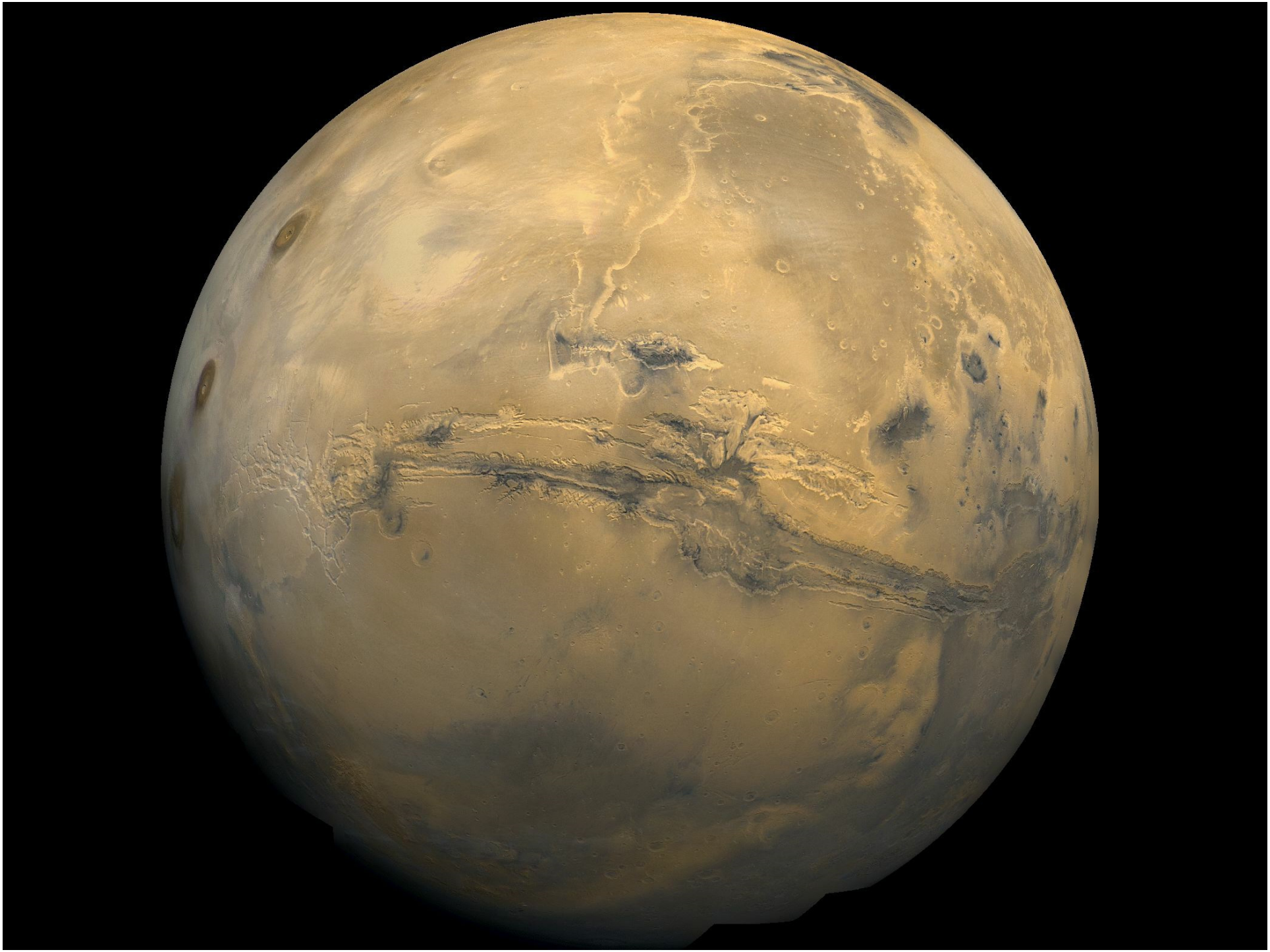
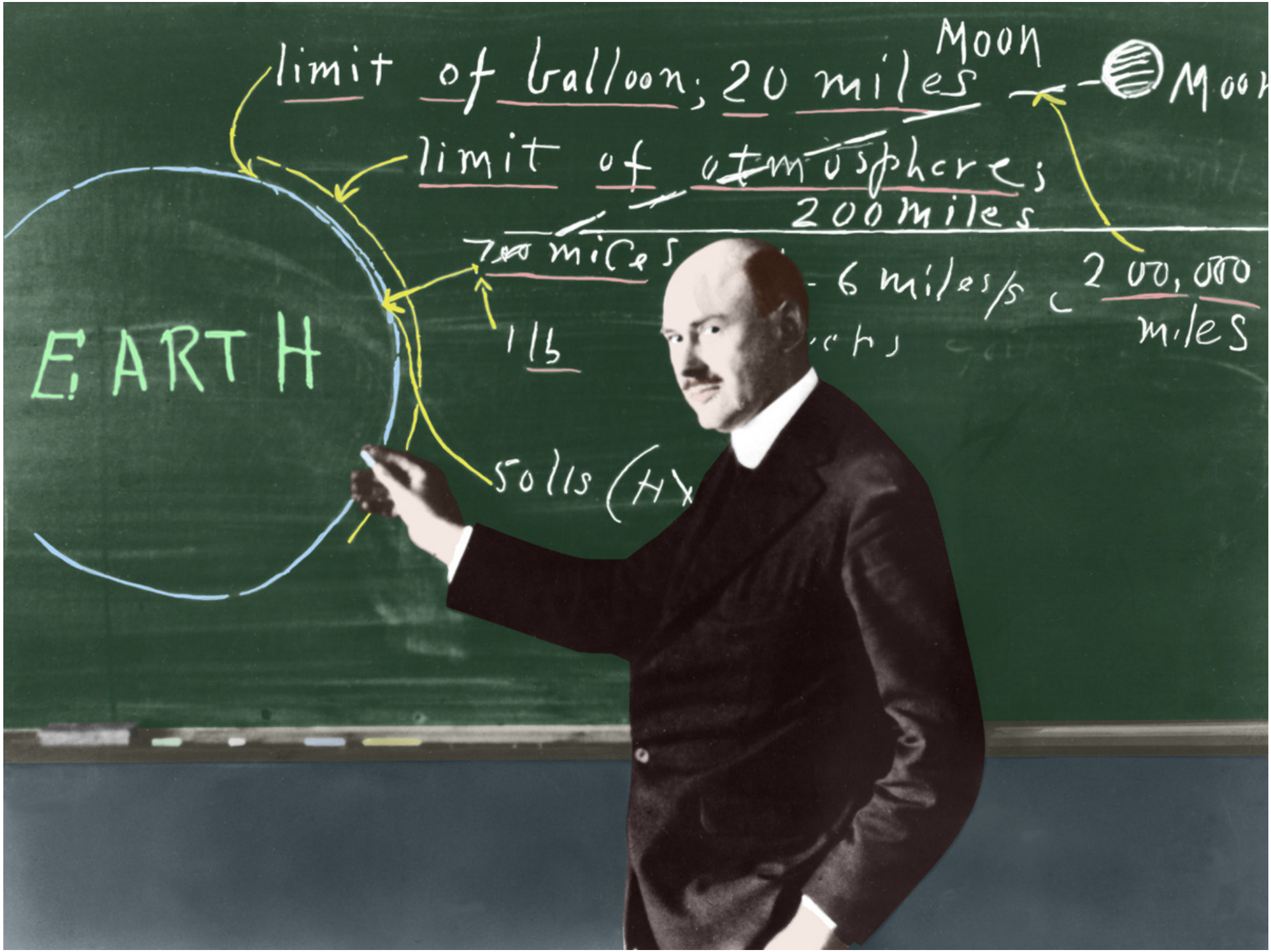
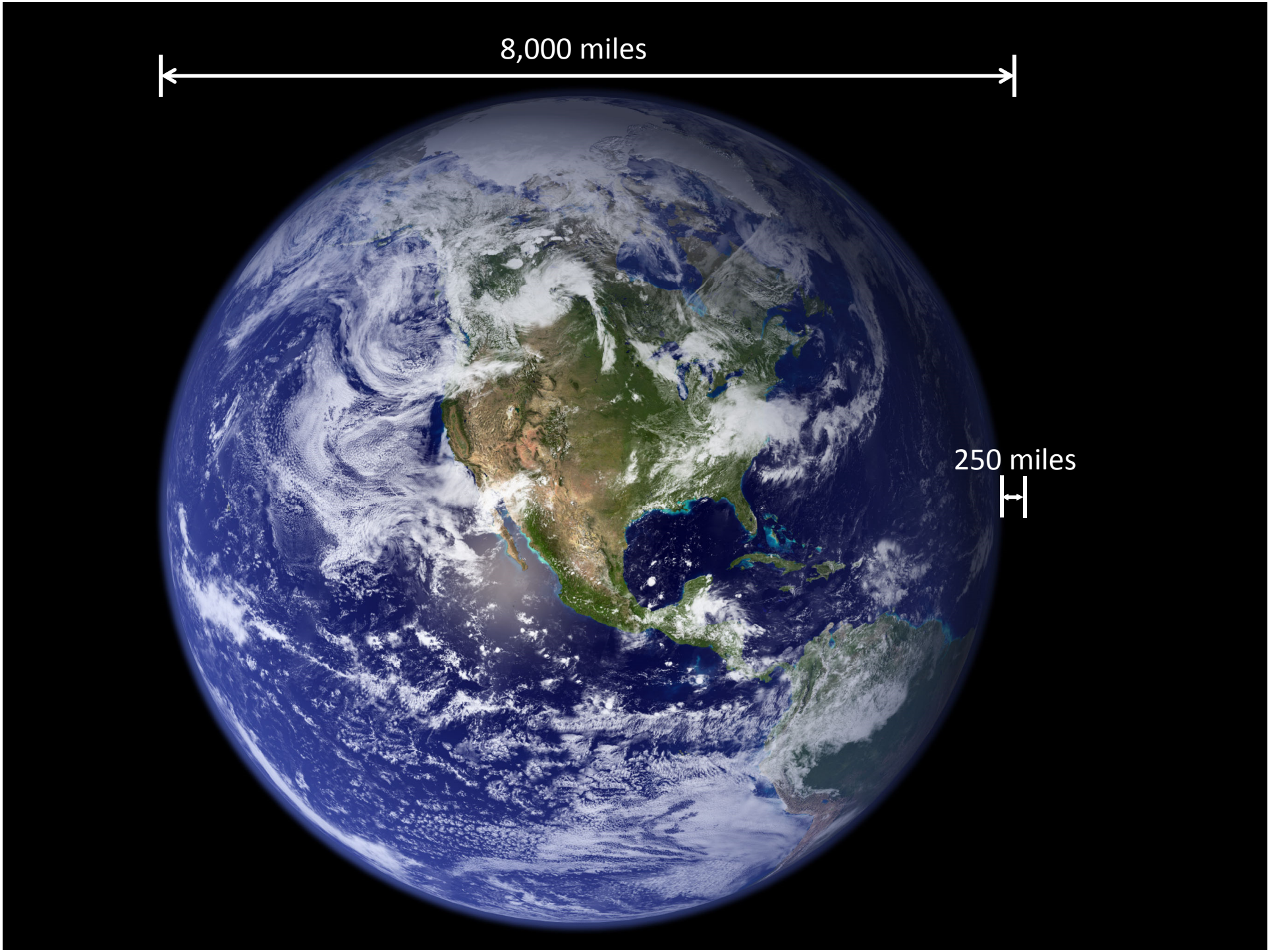
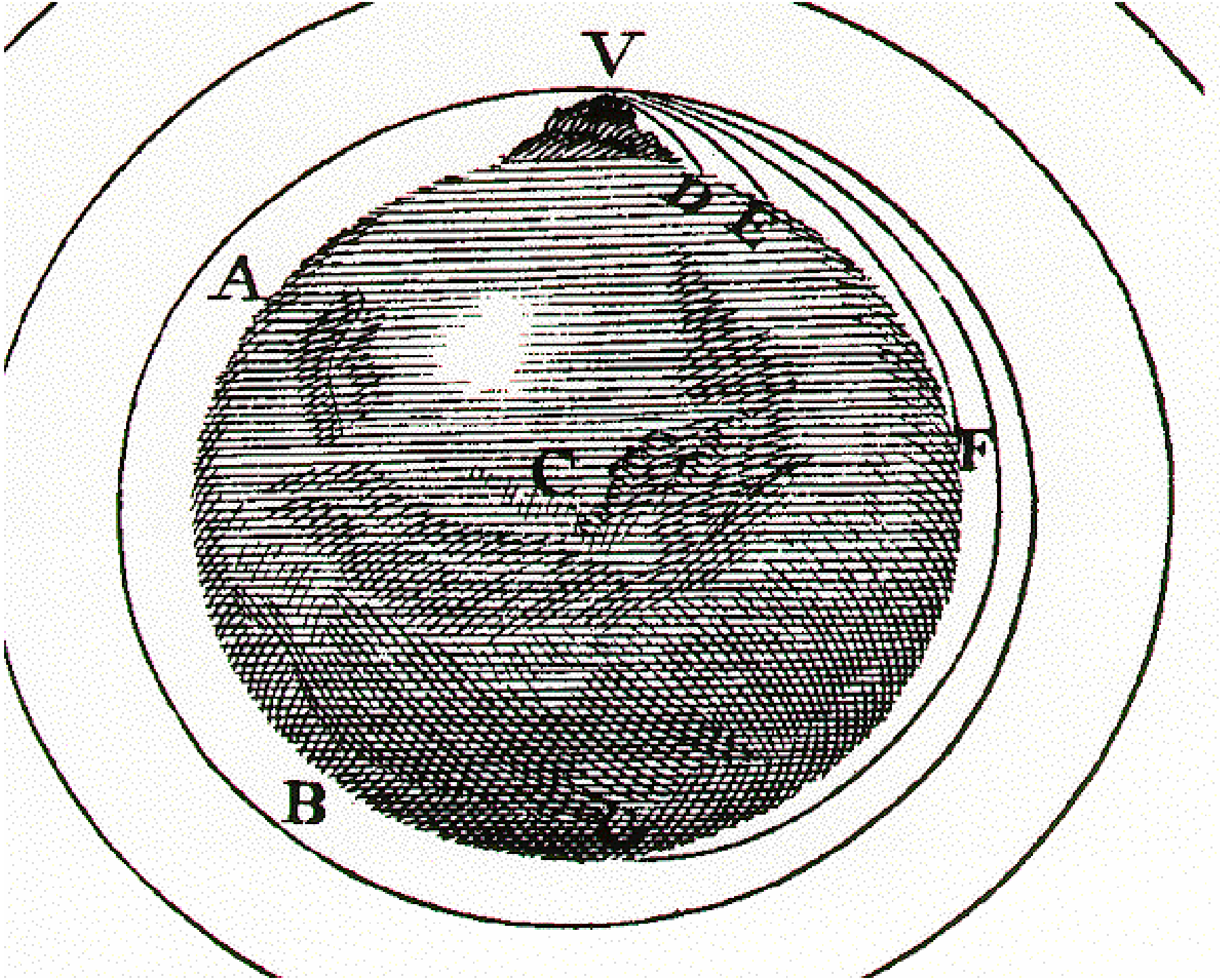



limit of balloon; 20 miles
Moon
limit of atmosphere;
200 miles
6 miles/s
200,000
miles
1 lb
EARTH

1. Low Earth Orbit
2. The Moon
3. Mars

1. Low Earth Orbit


8,000 miles
250 miles


V
D
E
A
F
C
B

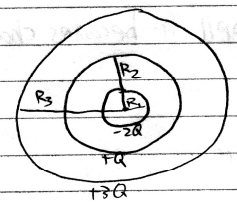
20,000 mph

99/100 F

Homework II

4

2.



Inside of $R_1 = 0$ since inside R_1 is isolated

Outside of R_1 must be $-2Q$ to get total charge on small shell

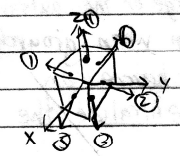
To cancel out $-2Q$ charge from outside of R_1 inside of R_2 must be $+2Q$

To get total of $+Q$ on R_2 outside of R_2 must be $-Q$

Thus inside of R_3 must cancel out $-Q$ so it is equal to $+Q$

Inside of $R_3 = +Q$

3.



$\varepsilon_0 \oint \vec{E} \cdot d\vec{A} = q_{inc}$

① left $y=0$ $0 \le x, z \le 1$

$d\vec{A} = -\hat{j}$

$\varepsilon_0 \int ((3.0\hat{i} + 2.5\hat{j}y) \cdot d\vec{A}$

$\varepsilon_0 2.5(-1) \int dA = \varepsilon_0 (-2.5)(1m^2) = q$

② right $= +\varepsilon_0 2.5(1m^2)$

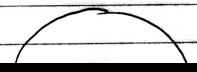
① & ② cancel out (symmetry)

③ & ④ $= 0$ ($\perp$ to E)

⑤ & ⑥ cancel out (symmetry)

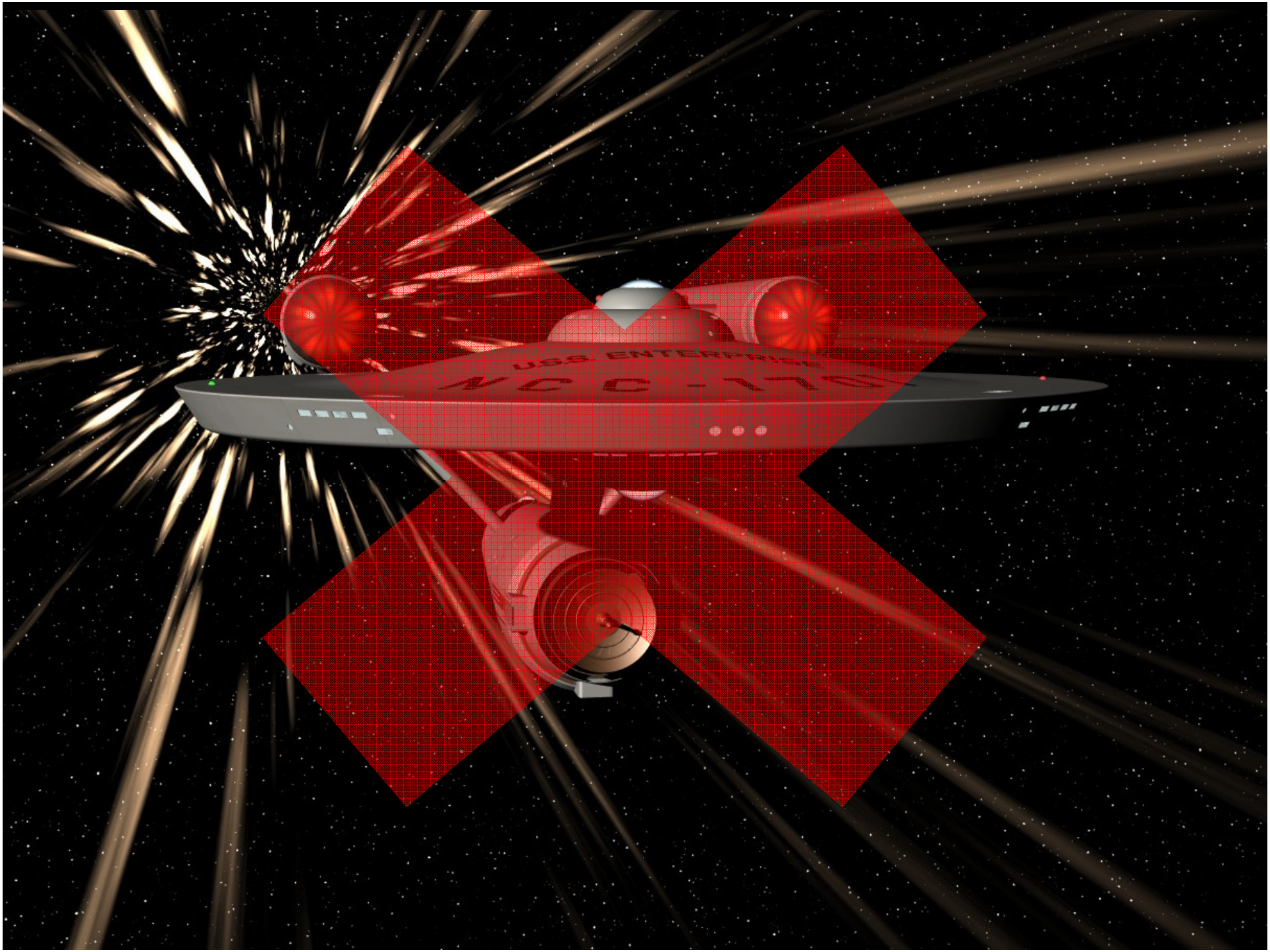
total charge contained in cube $= Q$

4.

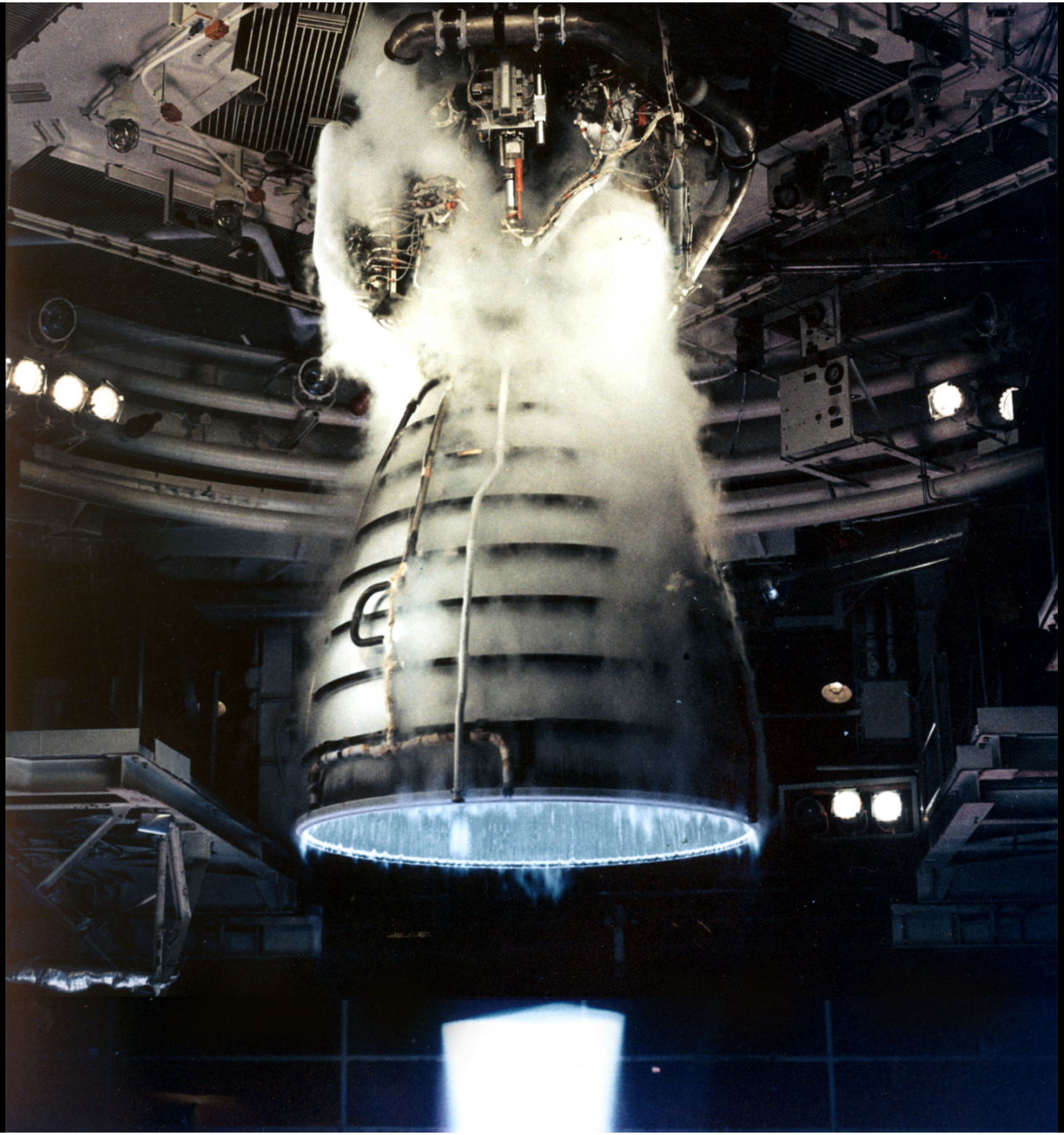


Q inside $r = \frac{\frac{4}{3}\pi r^3}{\frac{4}{3}\pi R^3}$ Q total

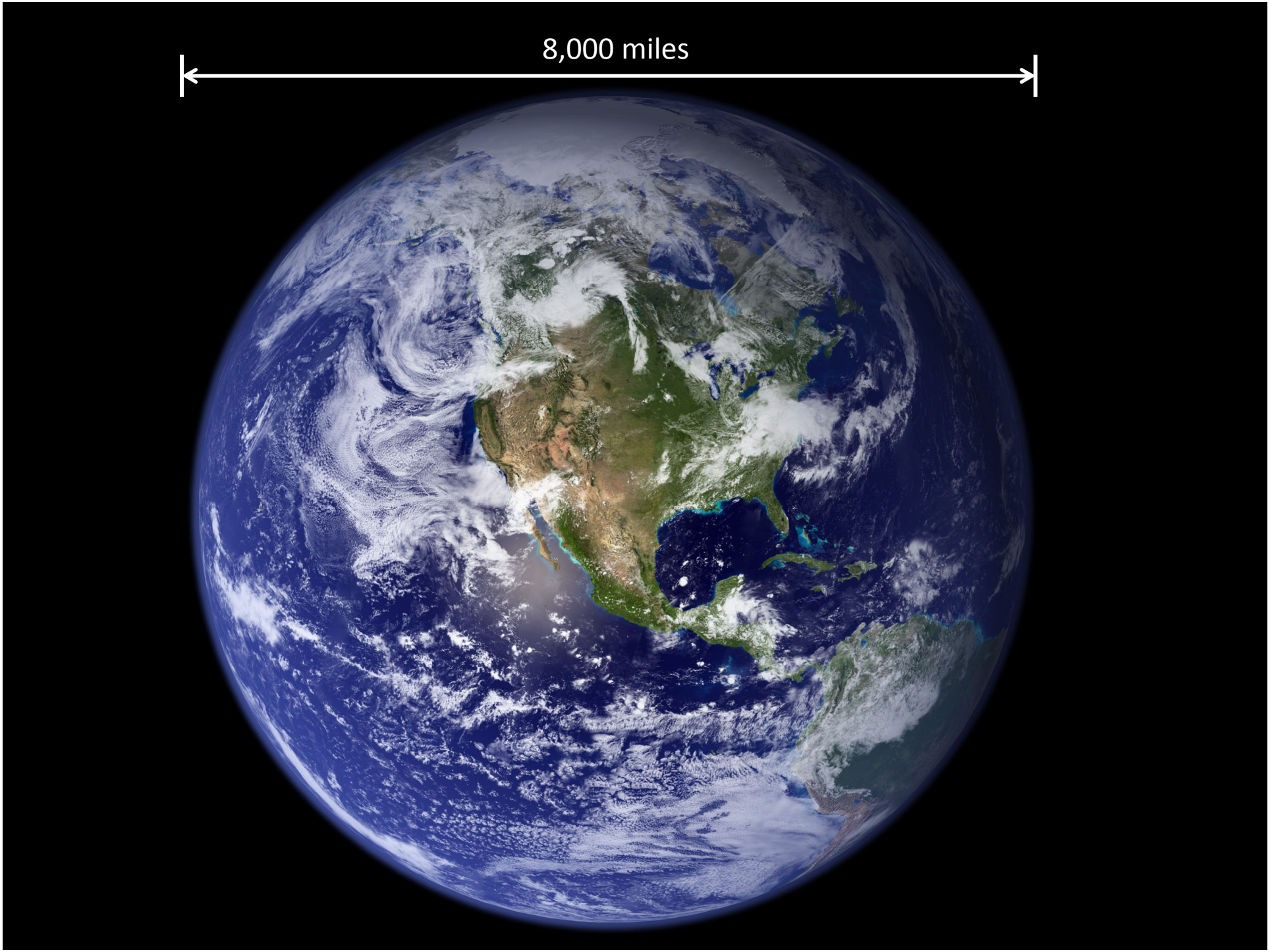
U.S.S. ENTERPRISE
NCC-1701


USS ENTERPRISE
NCC-1701

USA



2. The Moon


8,000 miles

240,000 miles

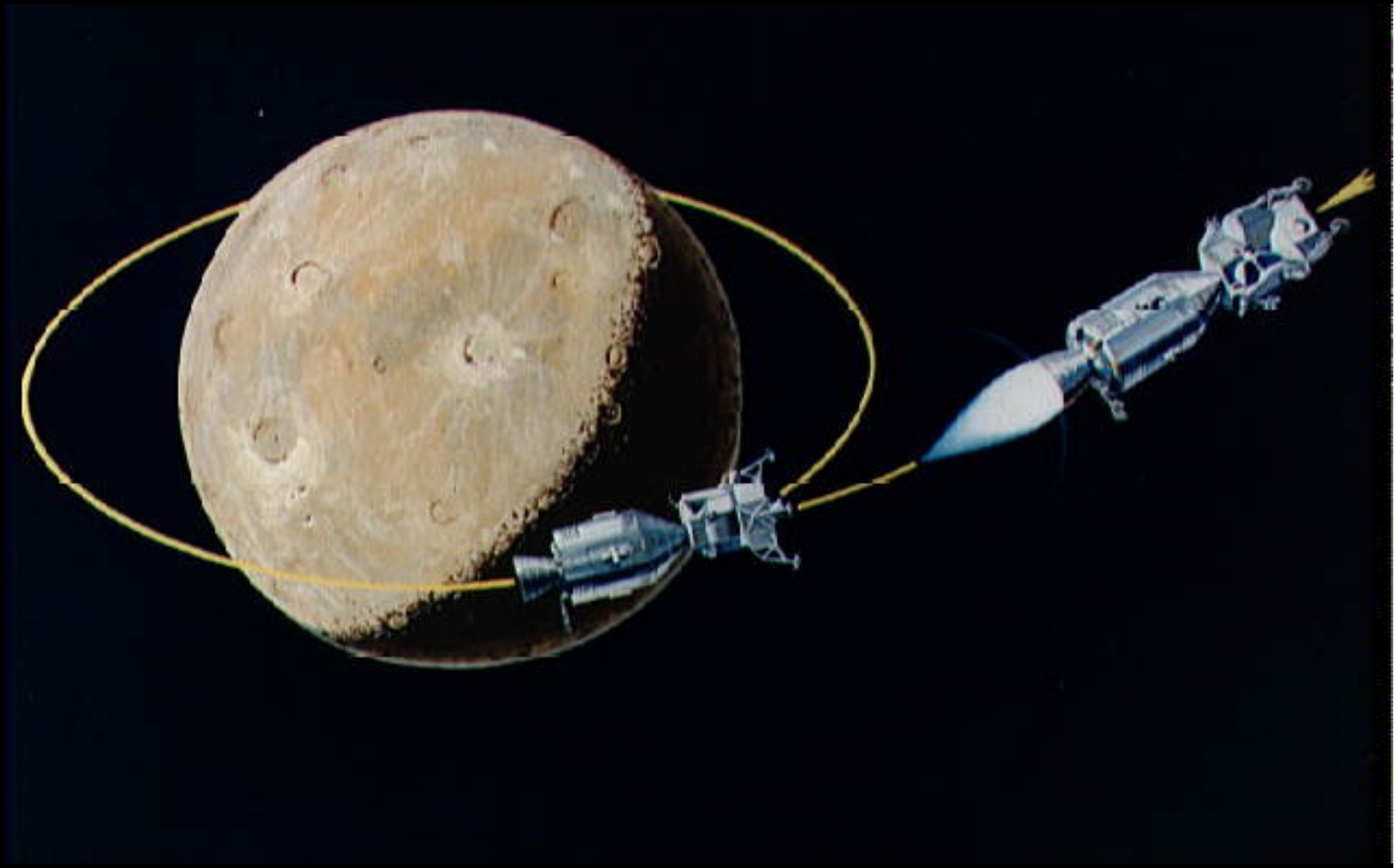
~~Distance~~

Speed

20,000 mph

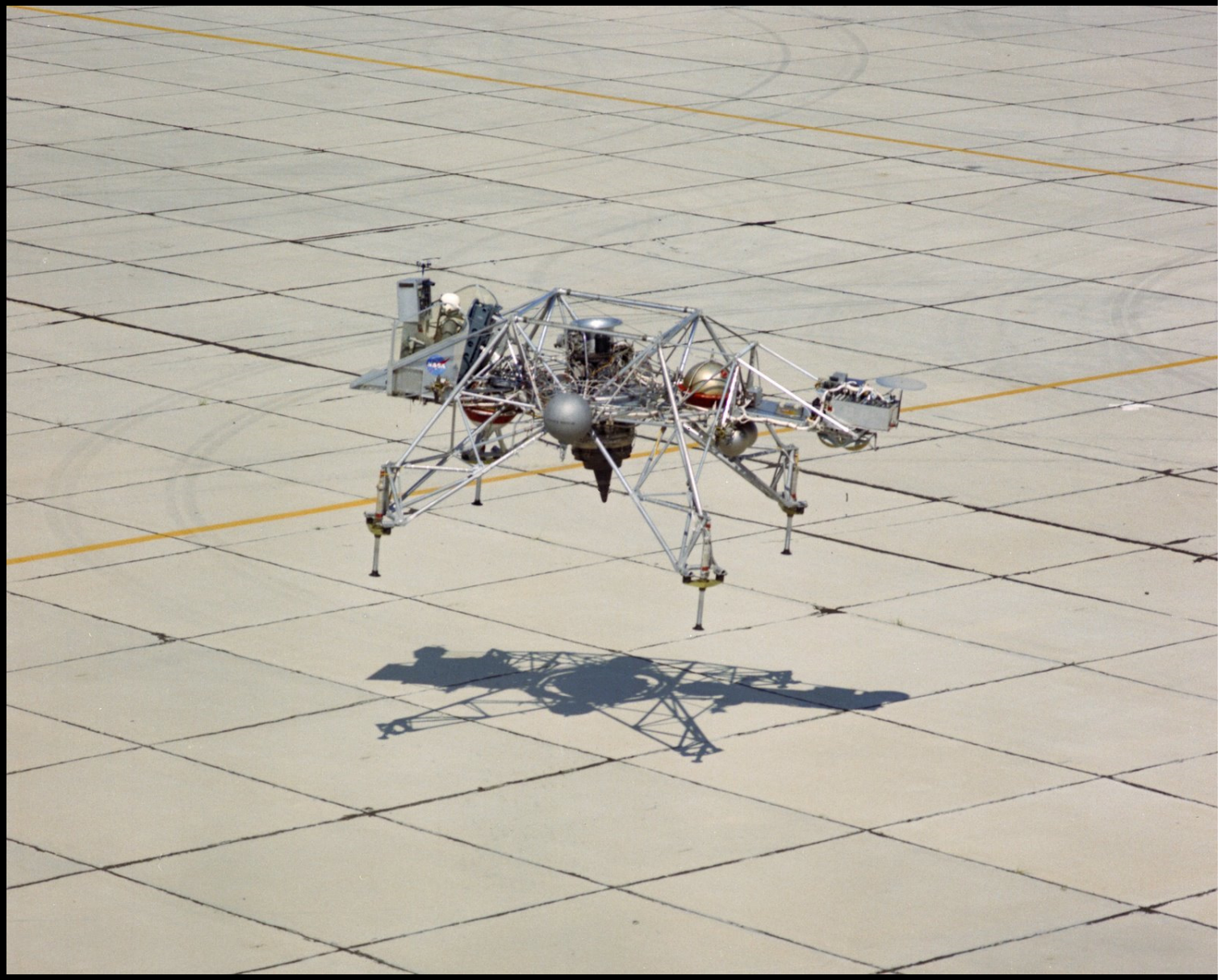
20,000 mph
8,200 mph

20,000 mph
8,200 mph
2,400 mph



20,000 mph
8,200 mph
2,400 mph
3,900 mph

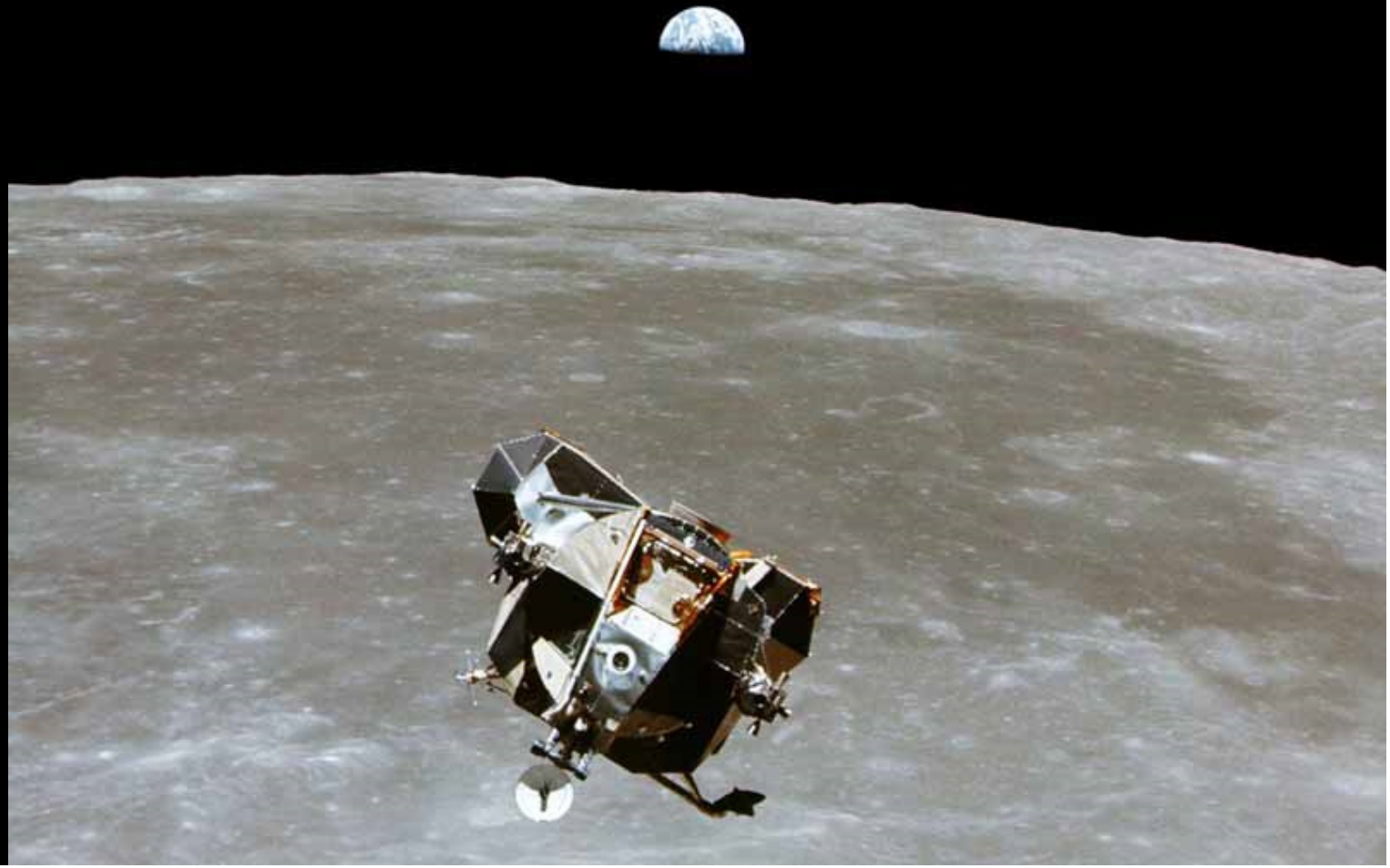
20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph



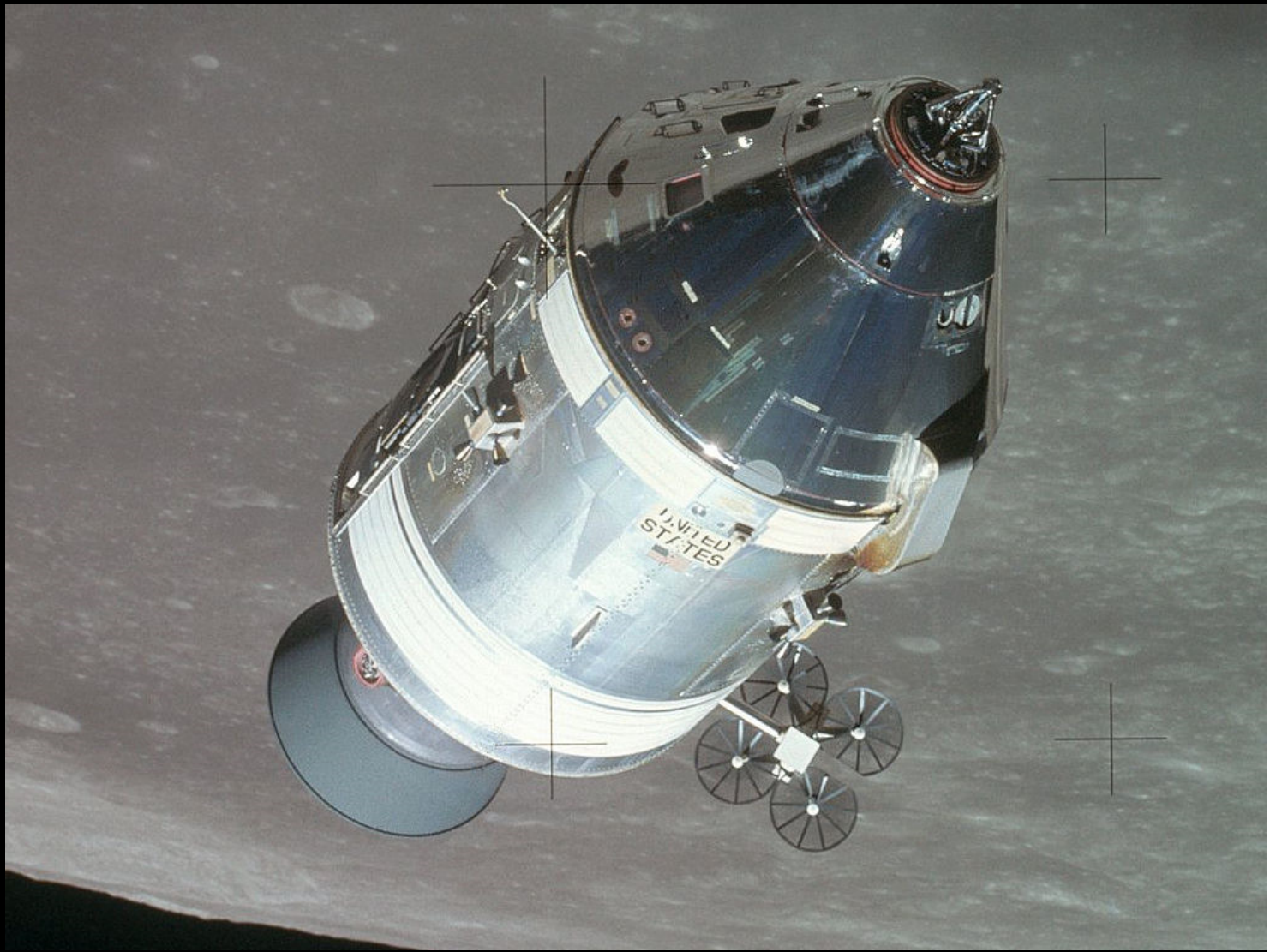
20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph

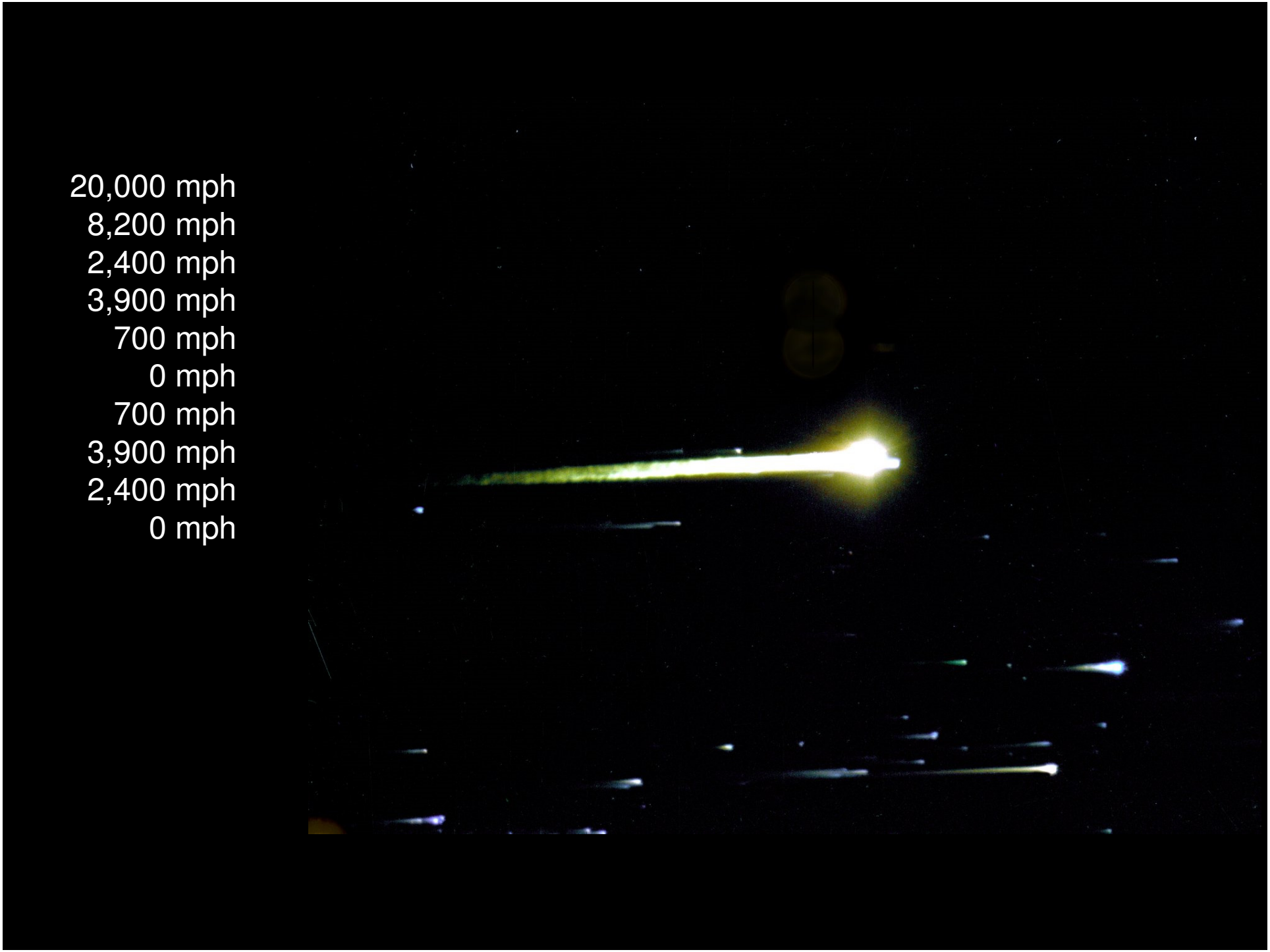
20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph
700 mph

20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph
700 mph
3,900 mph



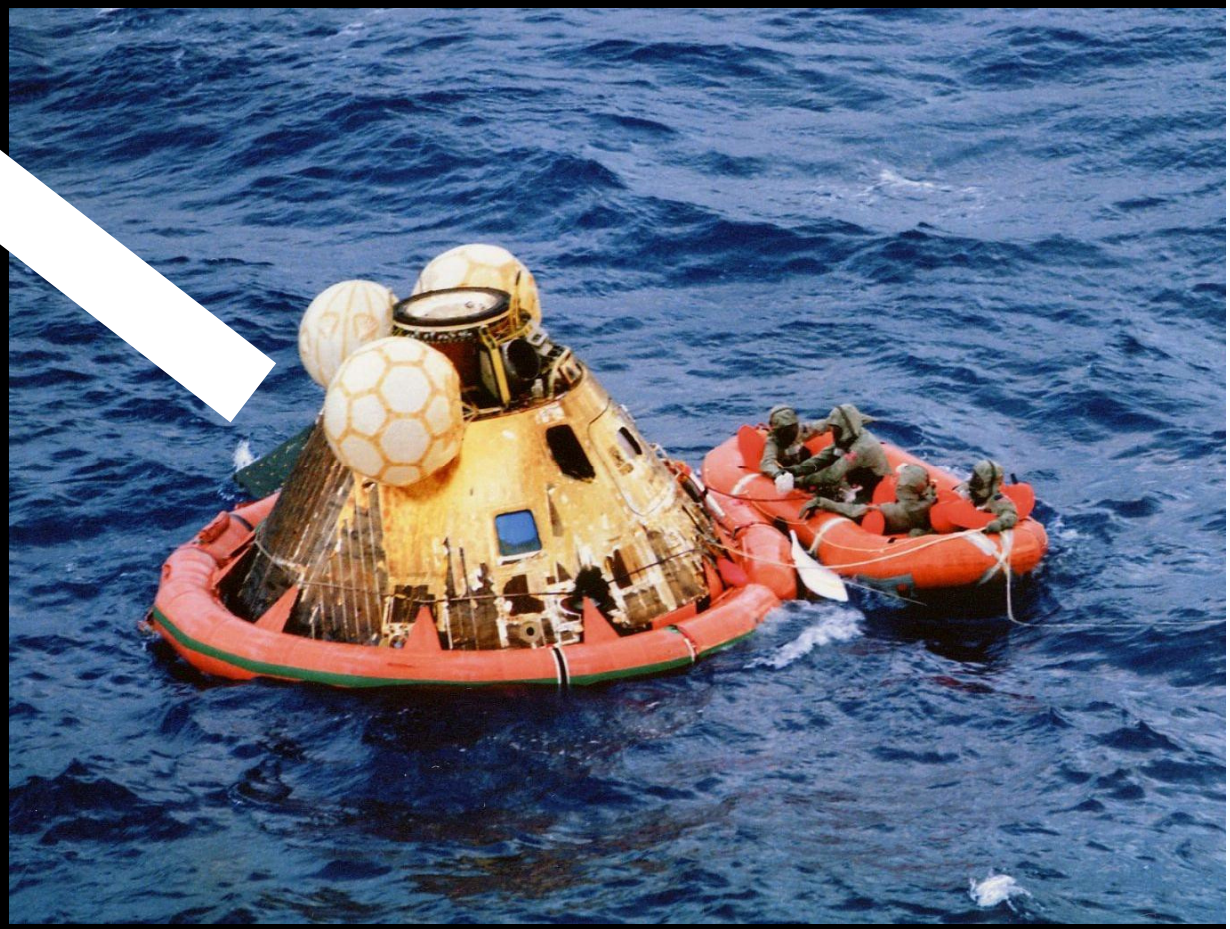
20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph
700 mph
3,900 mph
2,400 mph

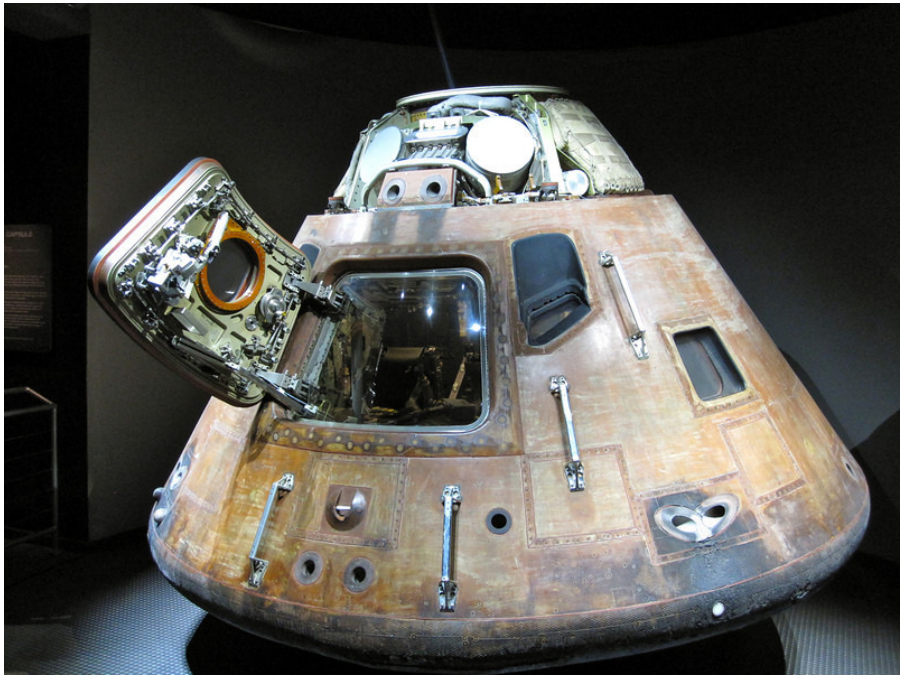



20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph
700 mph
3,900 mph
2,400 mph
0 mph

20,000 mph
8,200 mph
2,400 mph
3,900 mph
700 mph
0 mph
700 mph
3,900 mph
2,400 mph
0 mph
\+ 0 mph

42,000 mph





6 tons

+

×33

+

×4

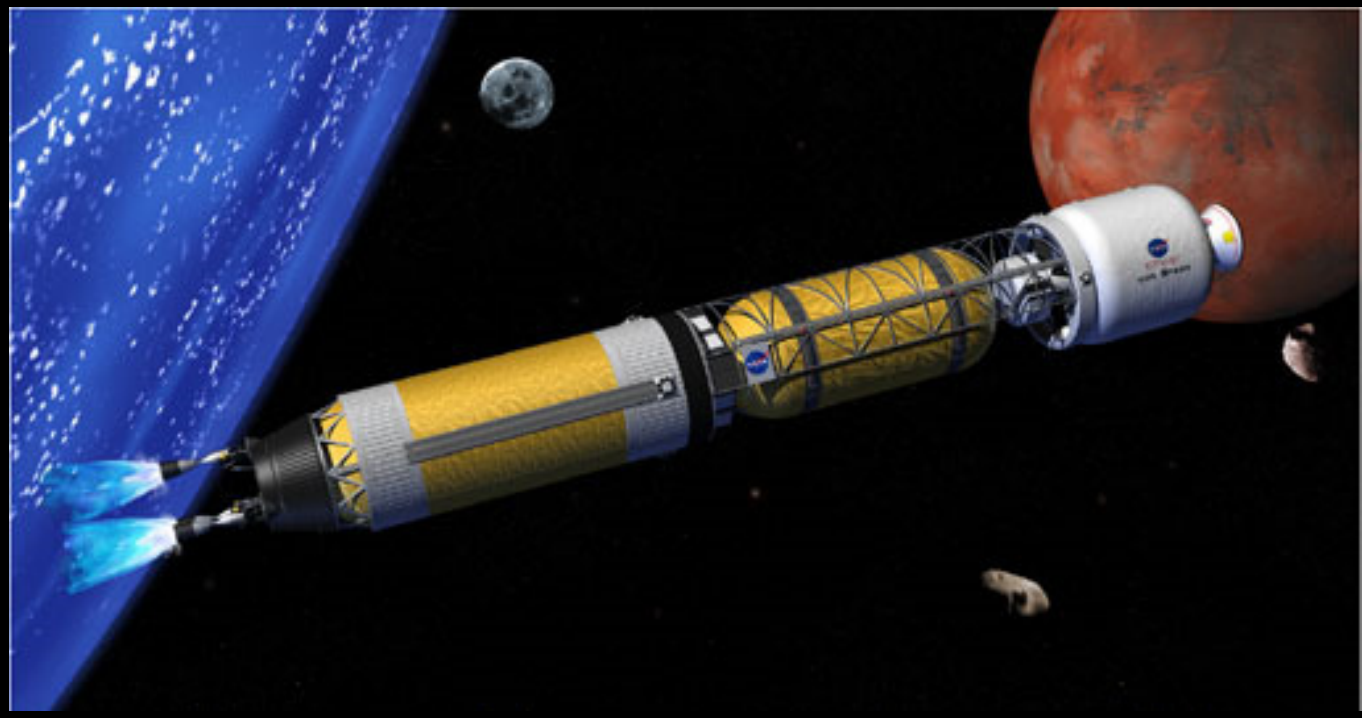
+

×1

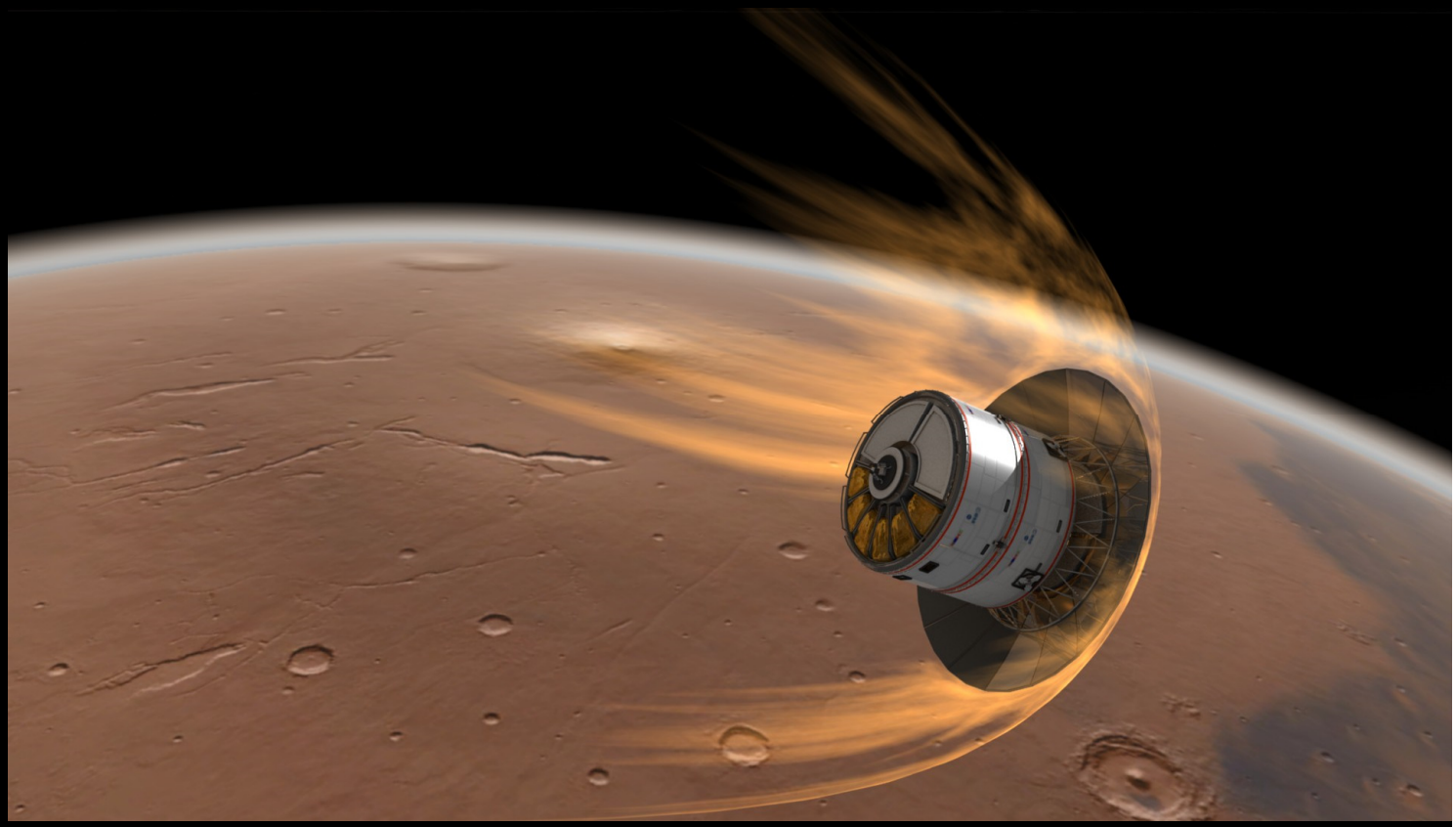
3. Mars

20,000 mph

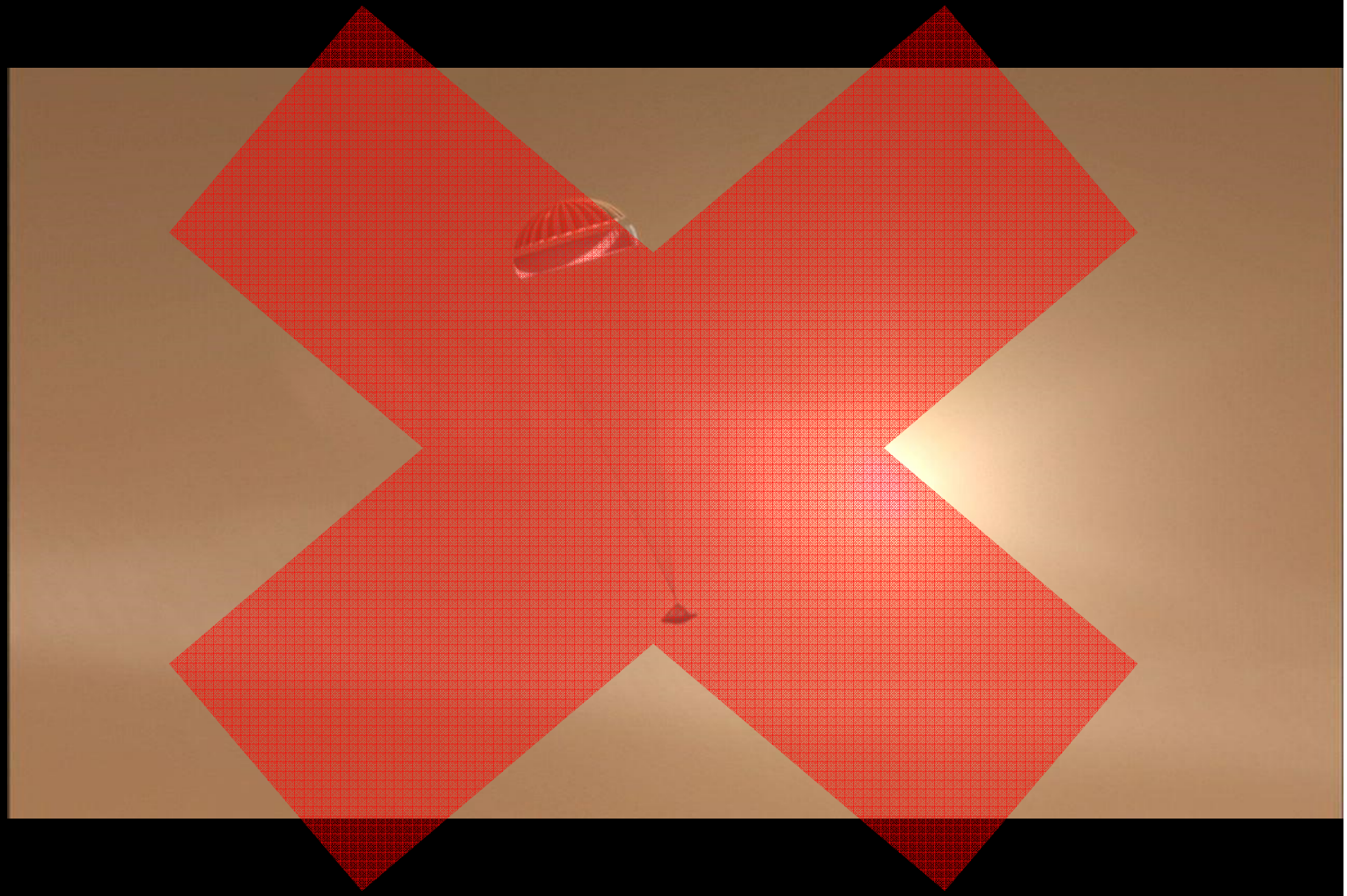
20,000 mph
9,000 mph



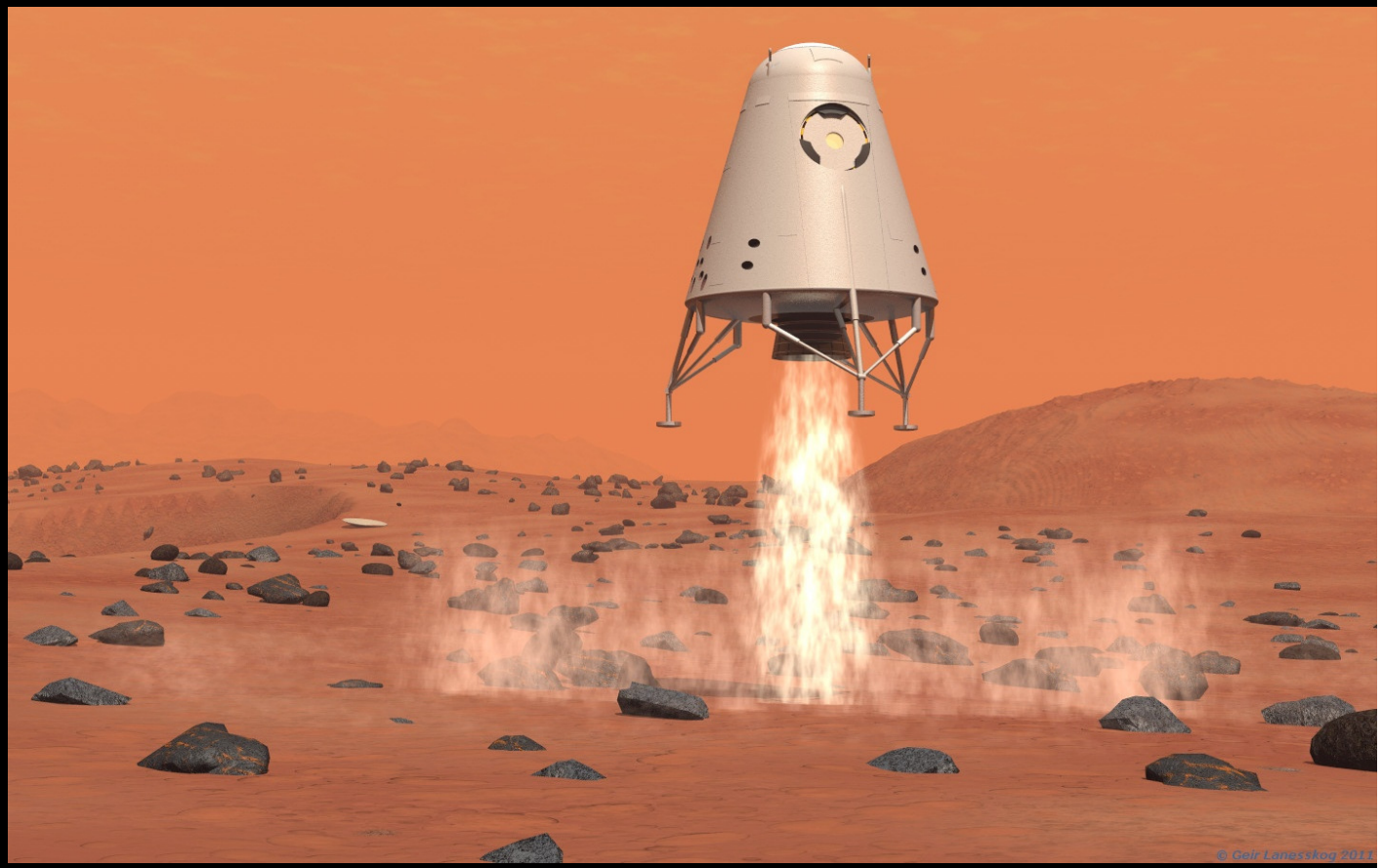
20,000 mph
9,000 mph
0 mph



20,000 mph
9,000 mph
0 mph
0 mph

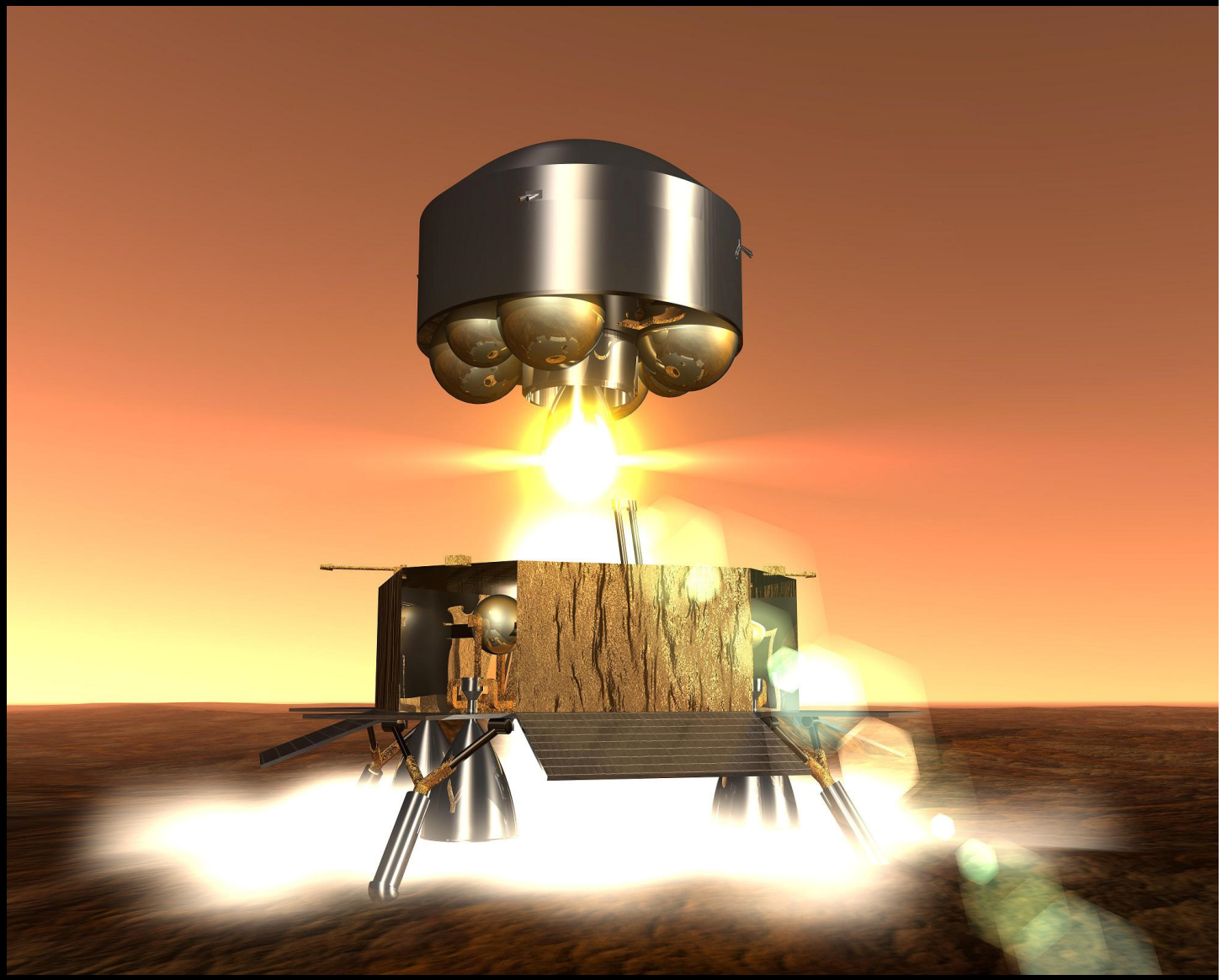


20,000 mph
9,000 mph
0 mph
2,000 mph

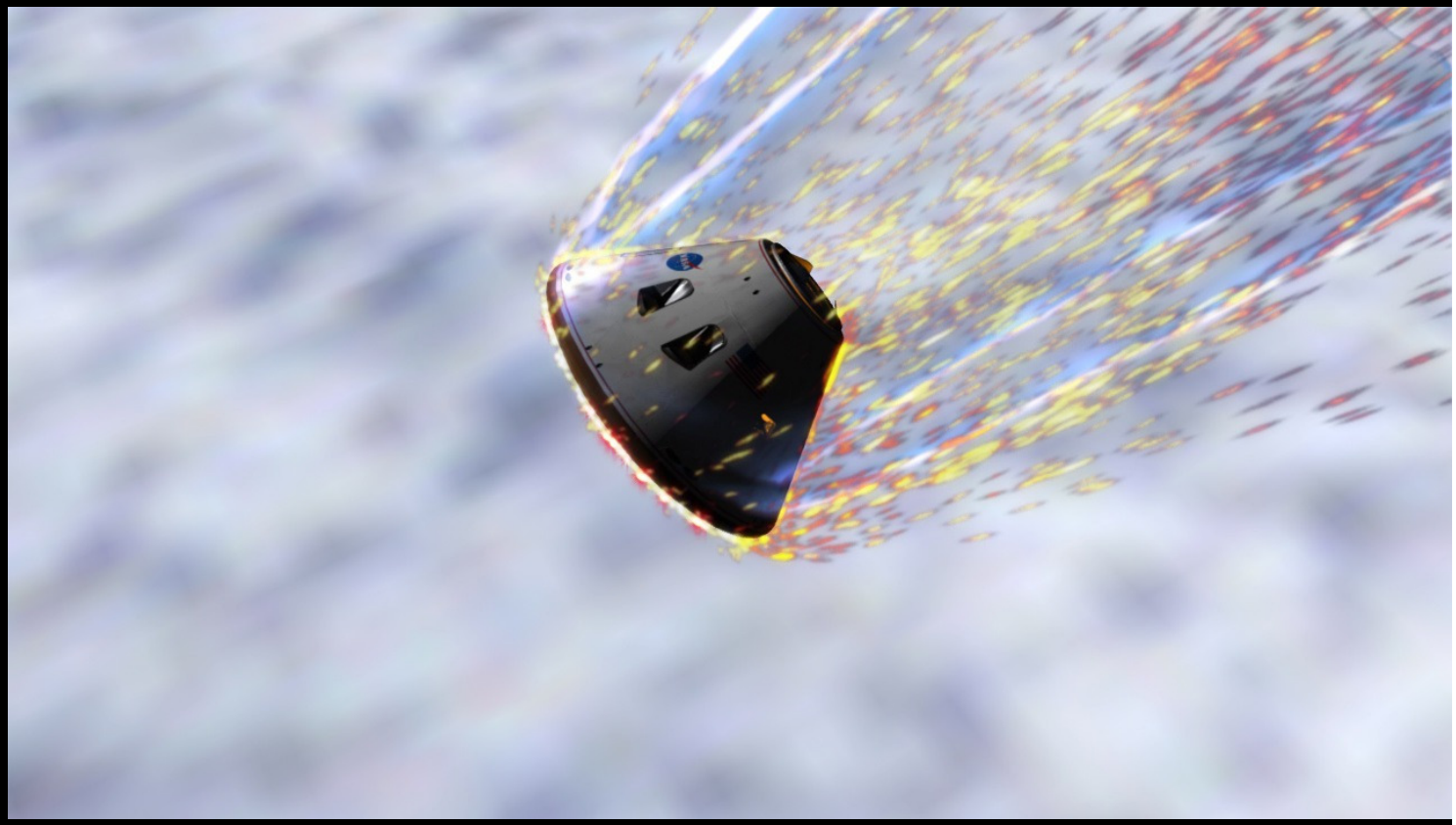


20,000 mph
9,000 mph
0 mph
2,000 mph
0 mph

20,000 mph
9,000 mph
0 mph
2,000 mph
0 mph
17,000 mph



20,000 mph
9,000 mph
0 mph
2,000 mph
0 mph
17,000 mph
0 mph



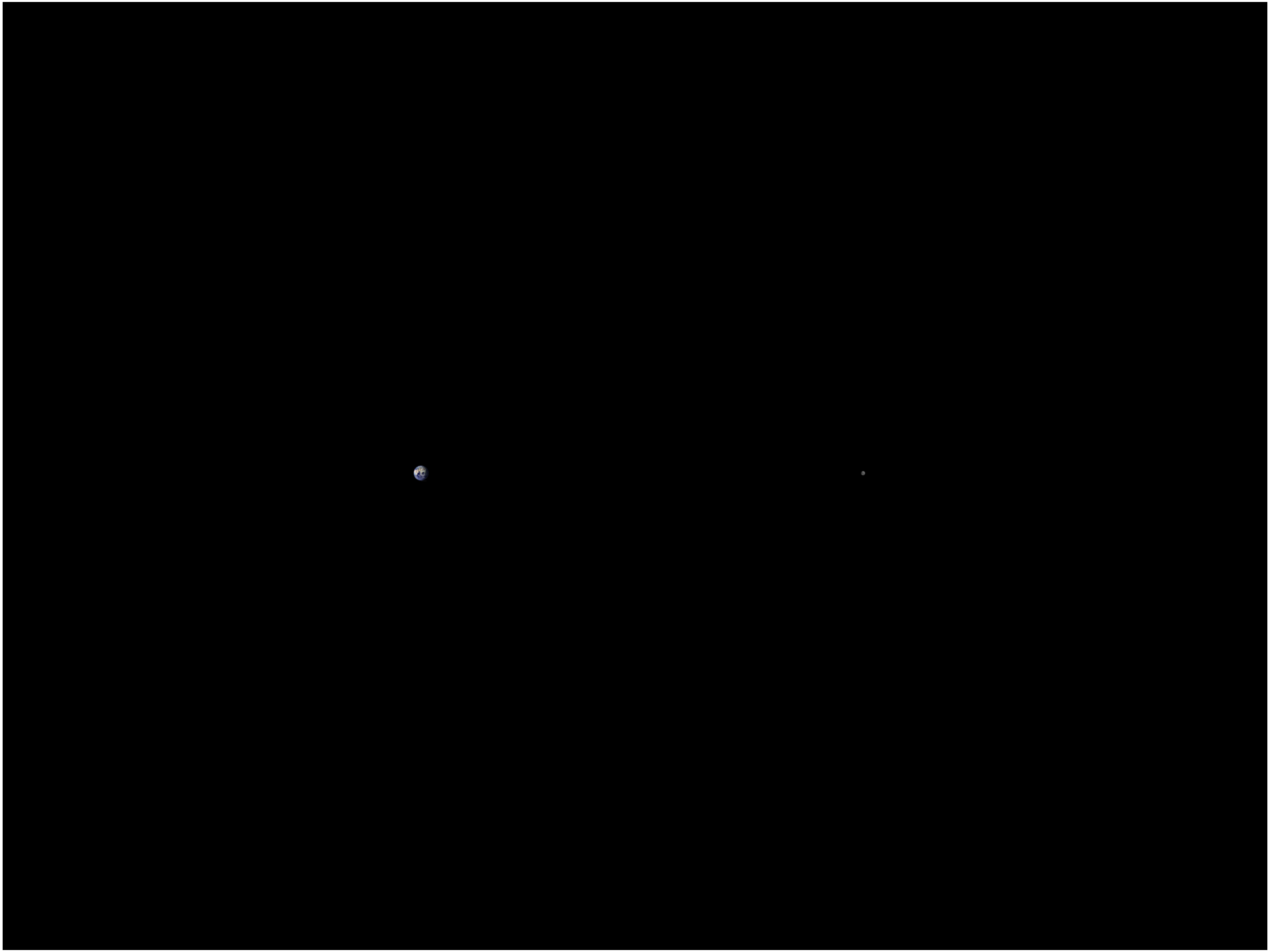
20,000 mph
9,000 mph
0 mph
2,000 mph
0 mph
17,000 mph
0 mph
\+ 0 mph

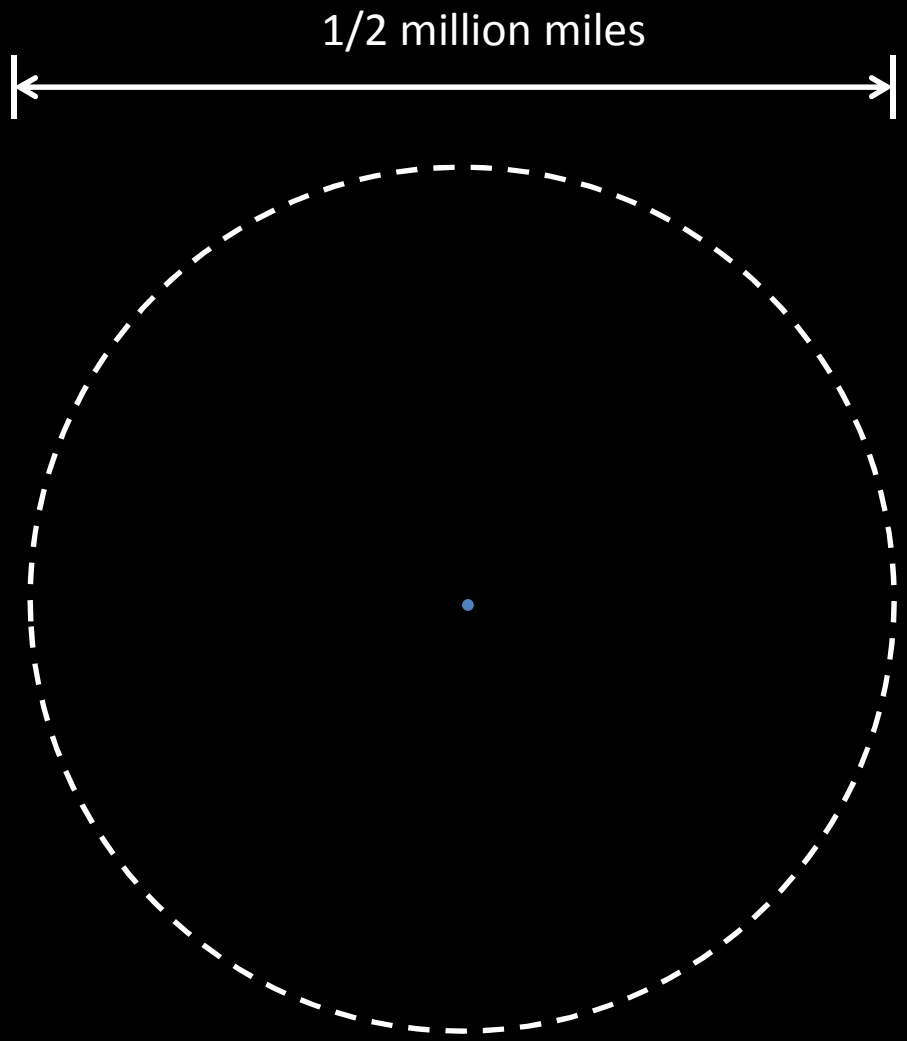
48,000 mph

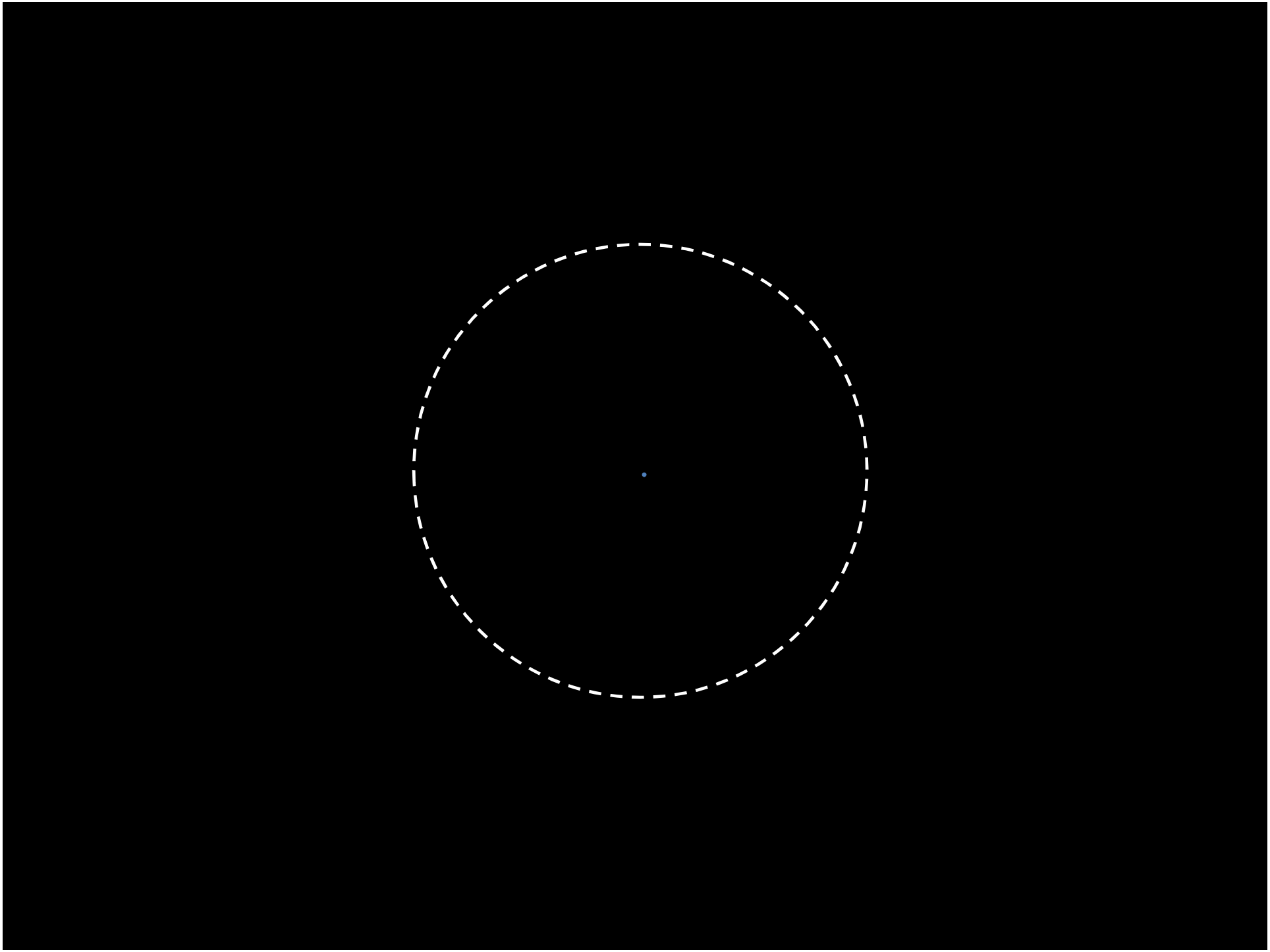
Speed

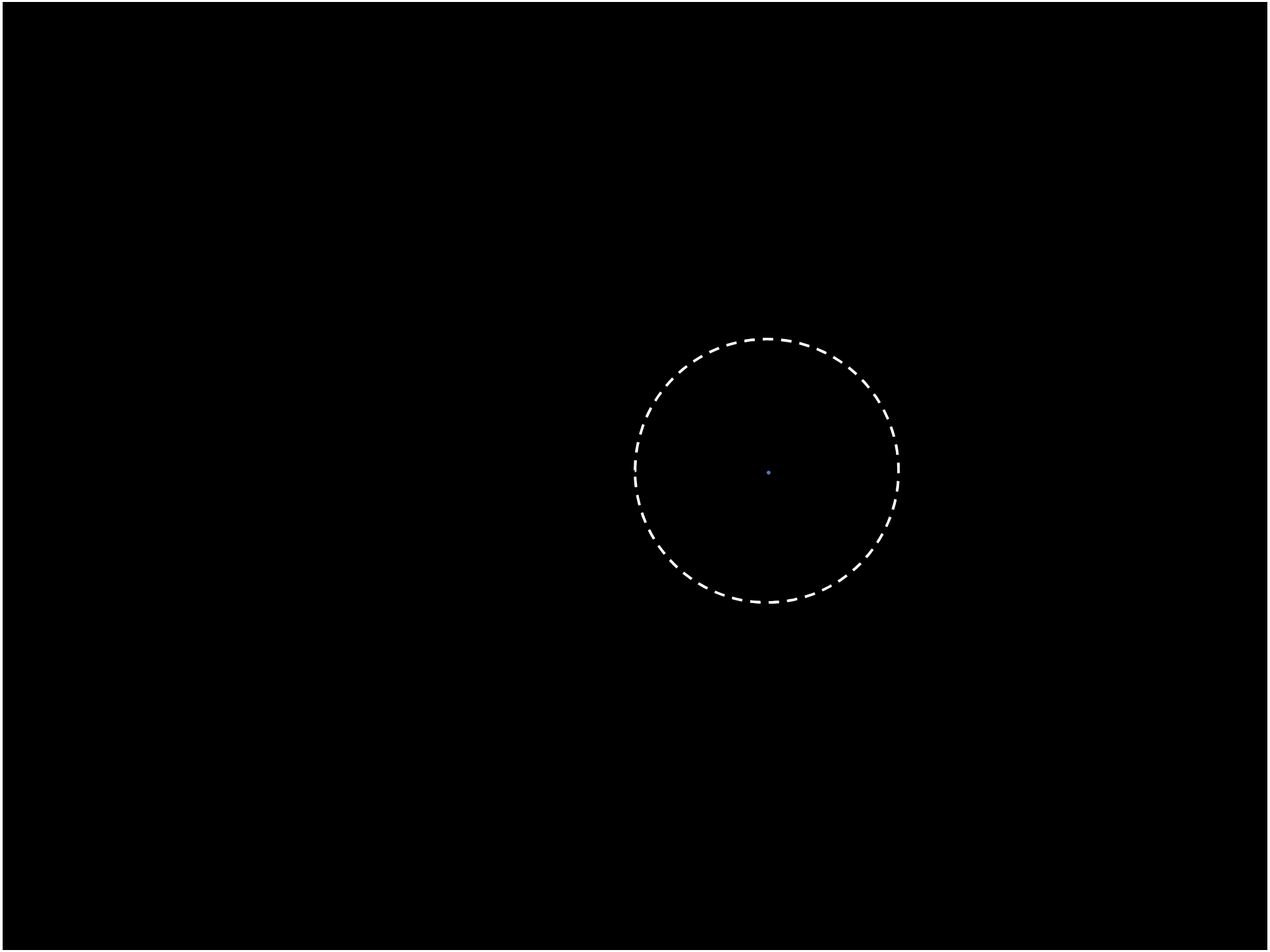
Distance

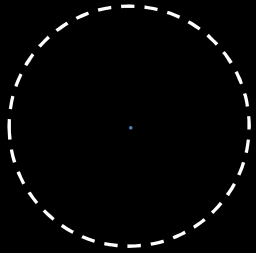
240,000 miles

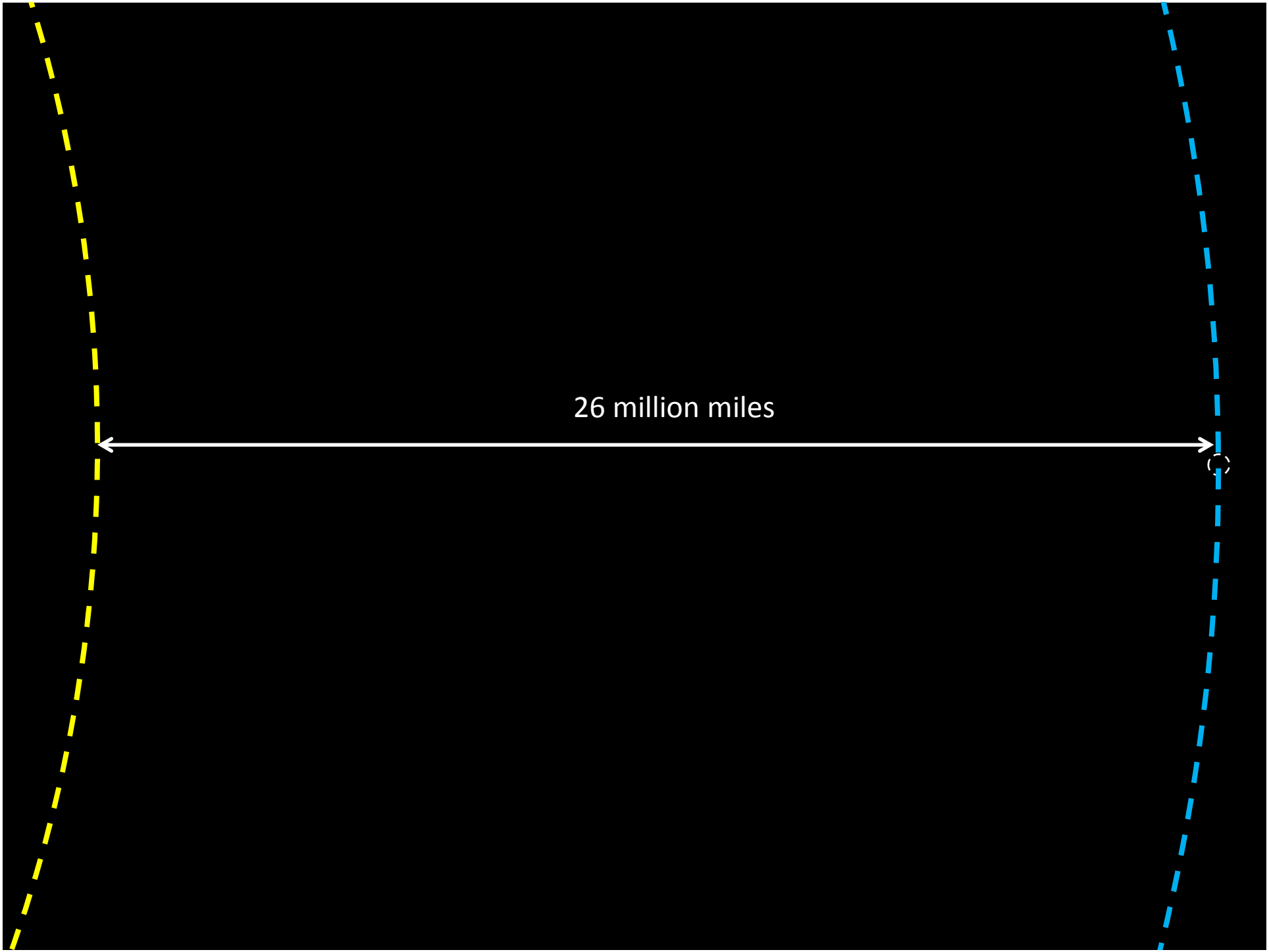


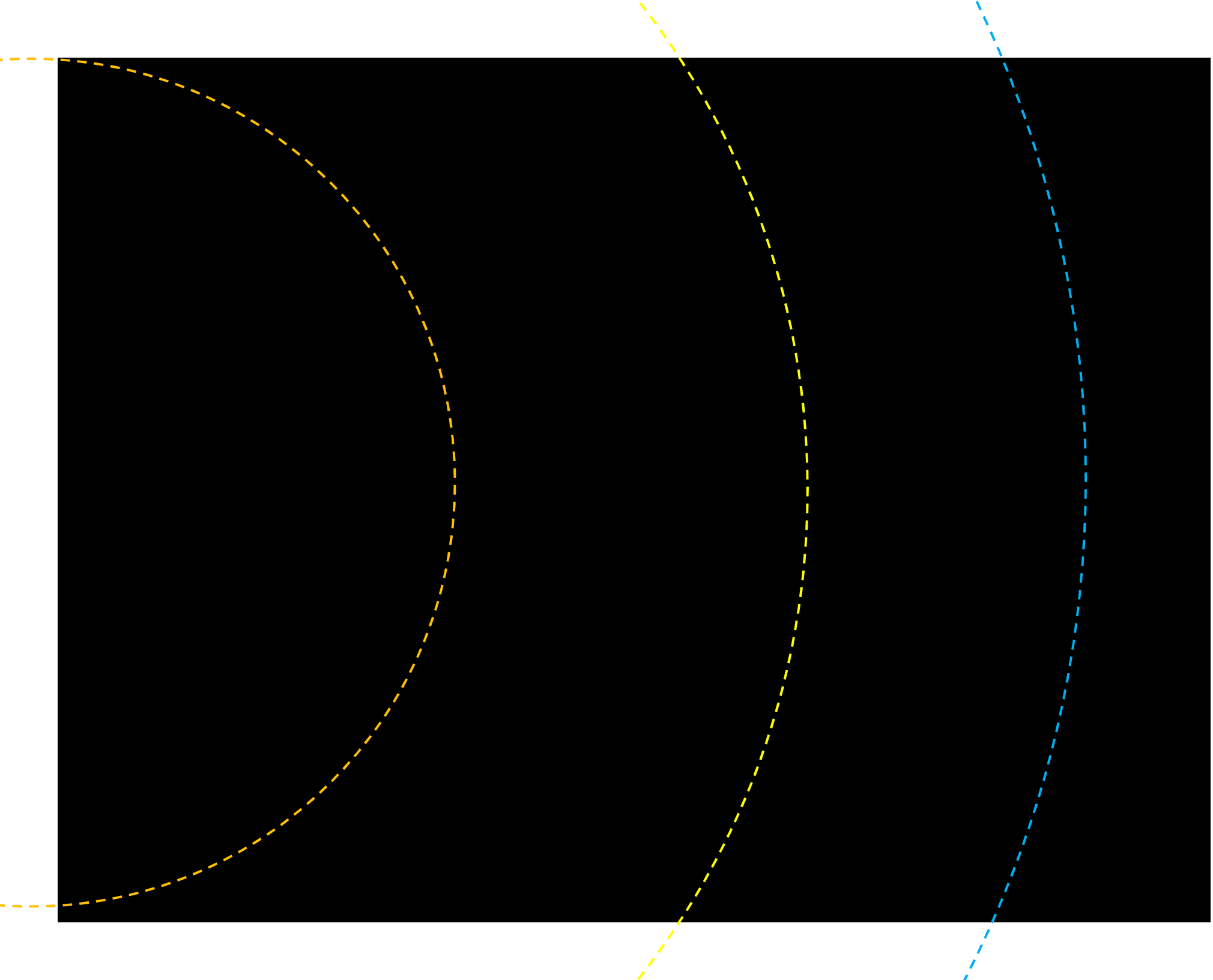

1/2 million miles

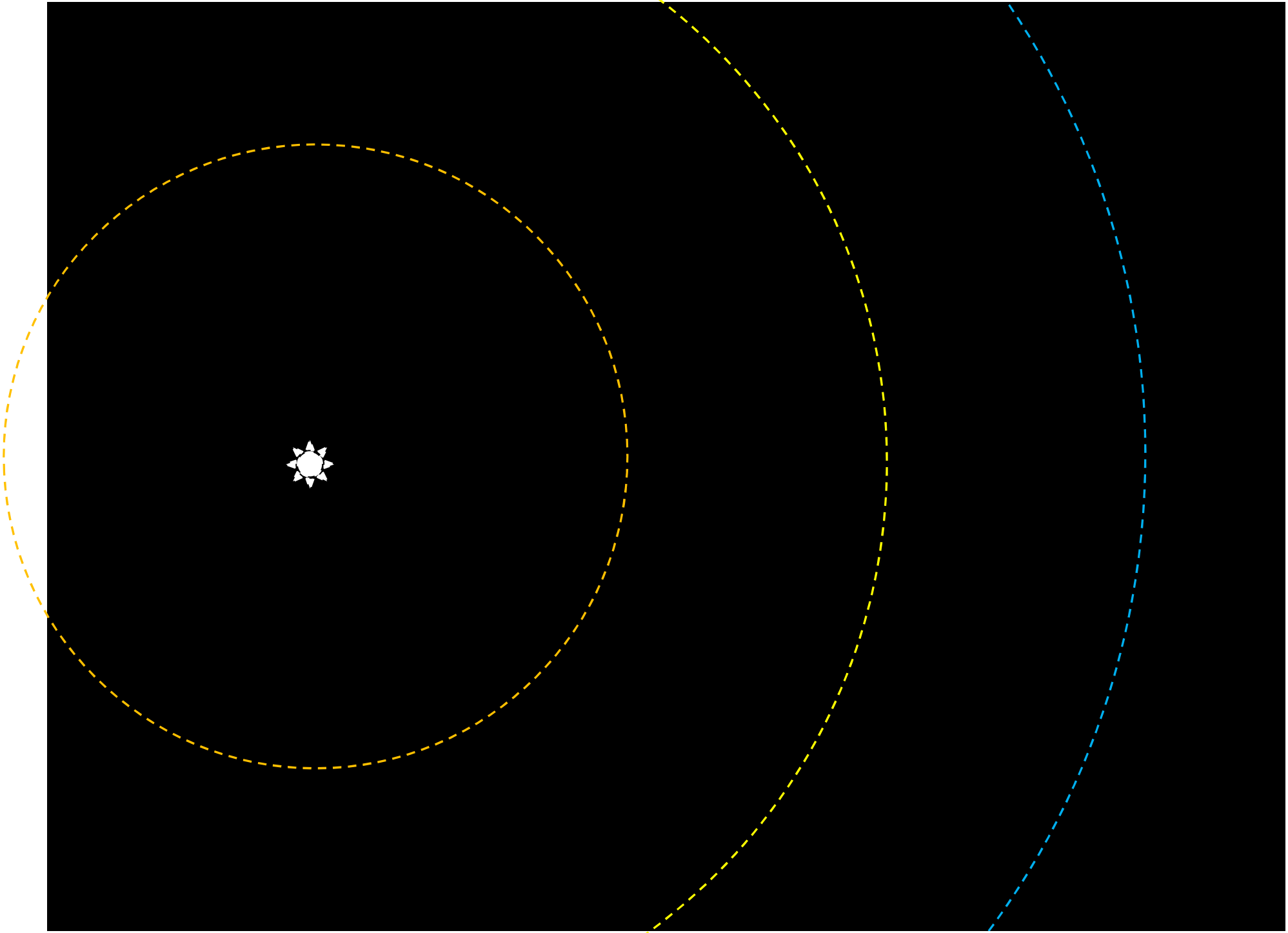


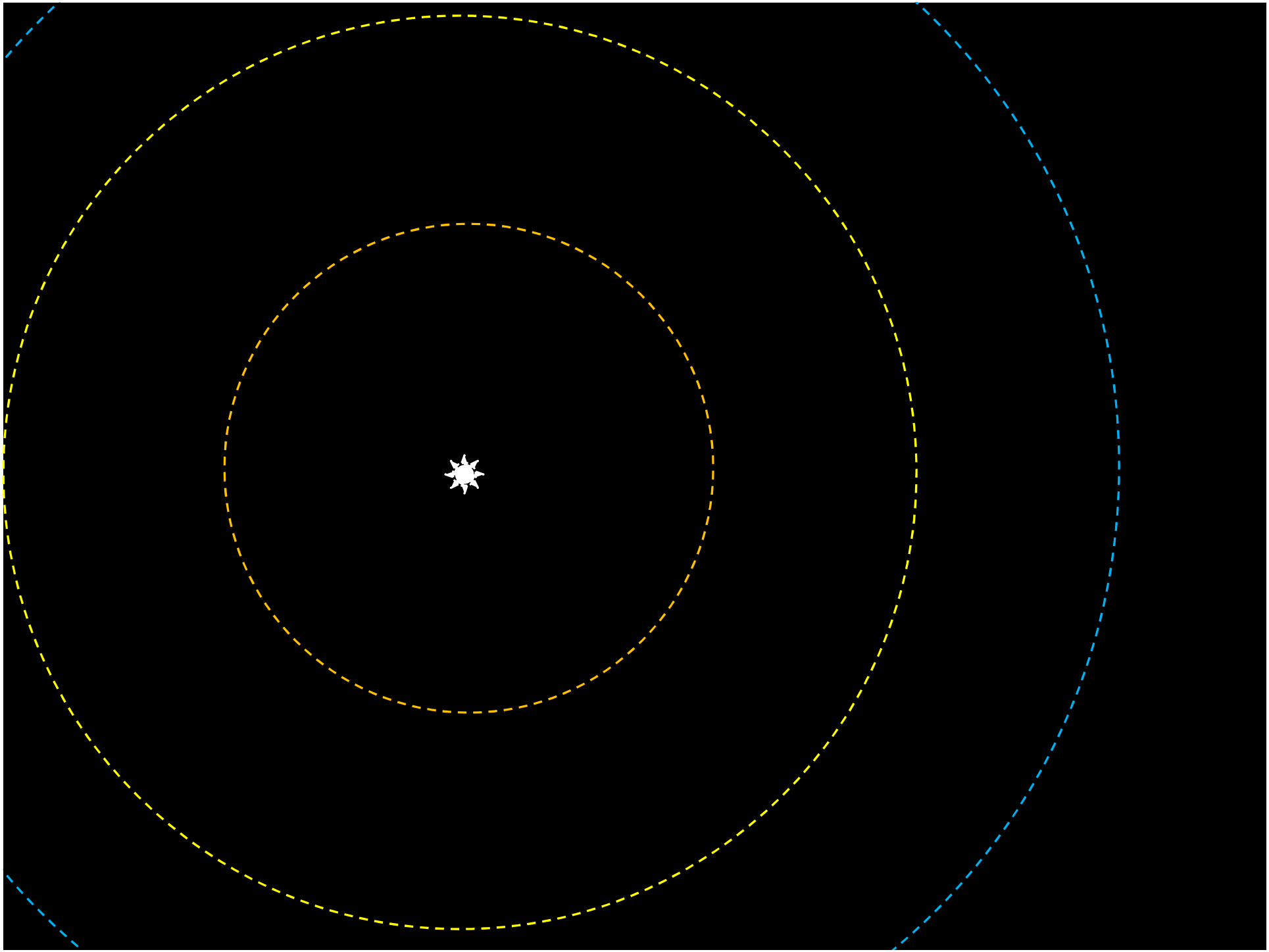


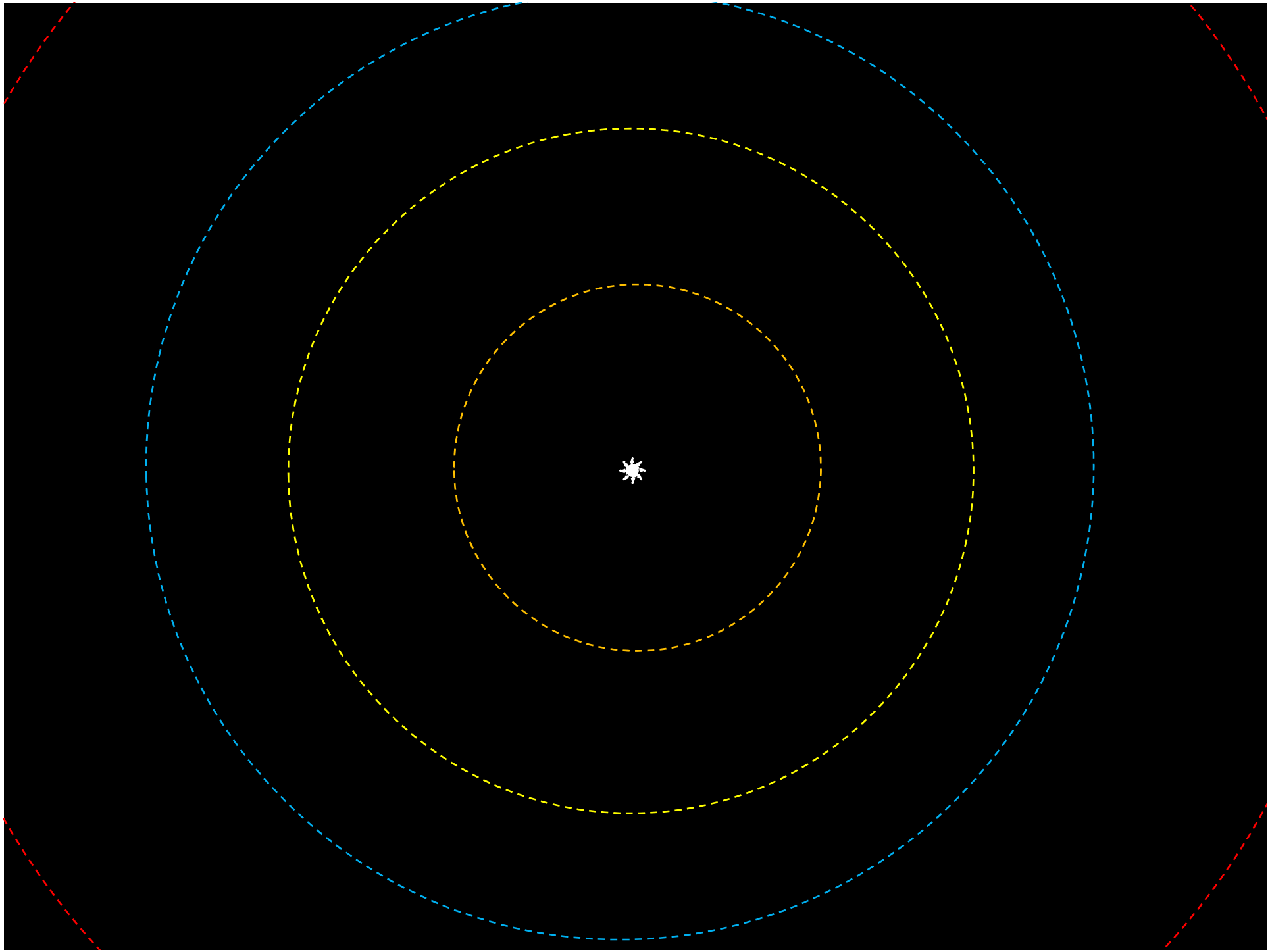


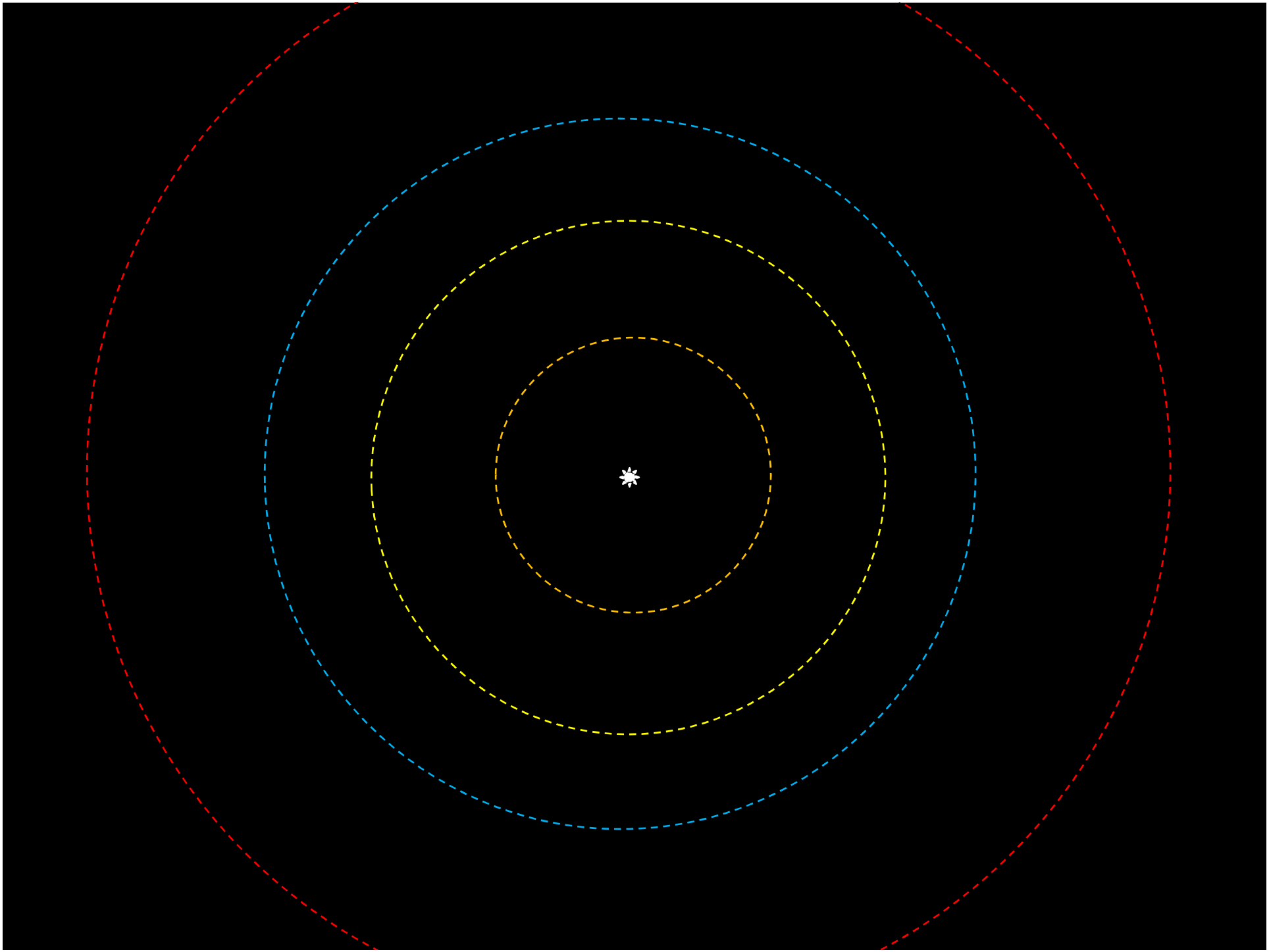

26 million miles

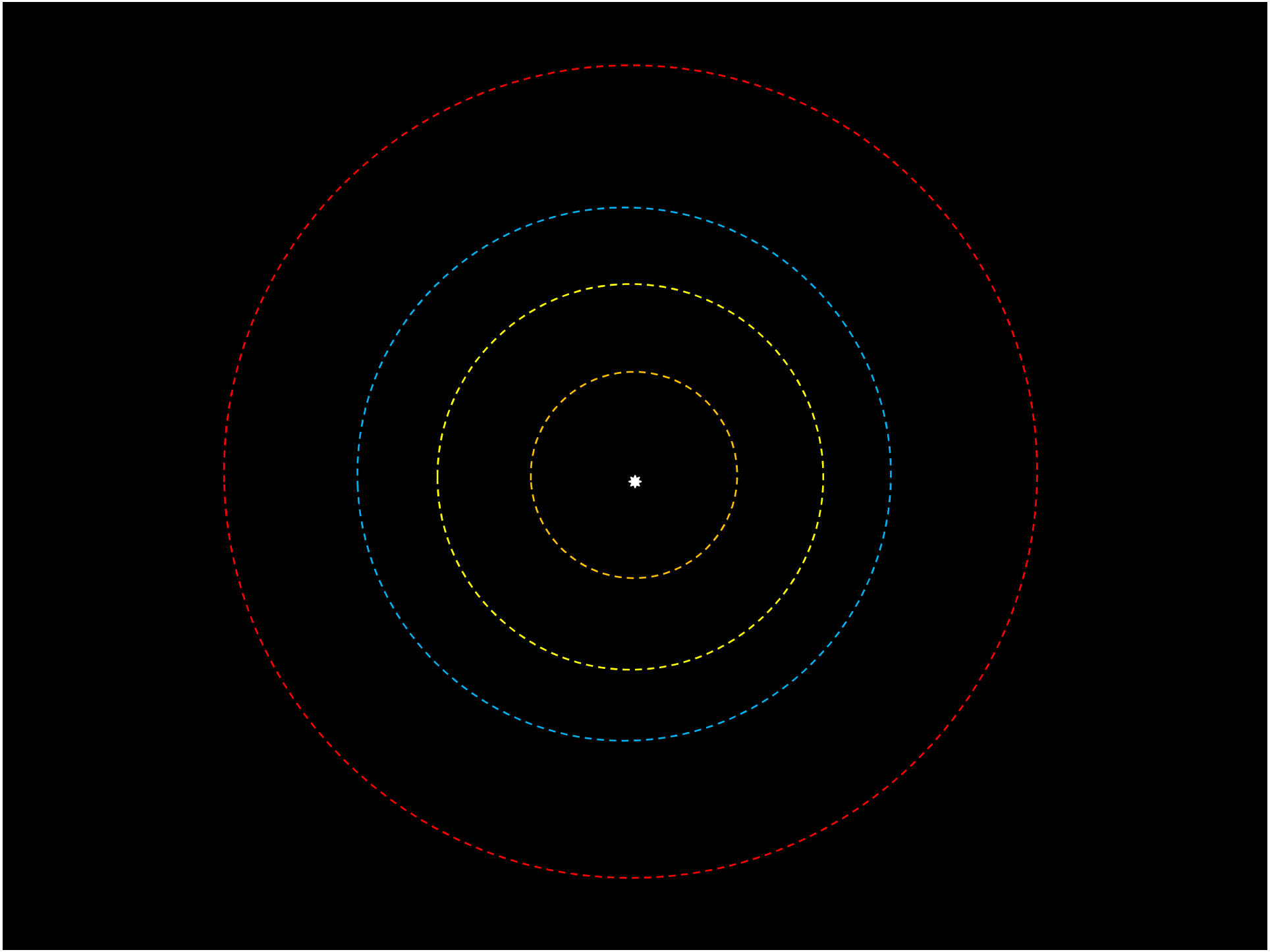


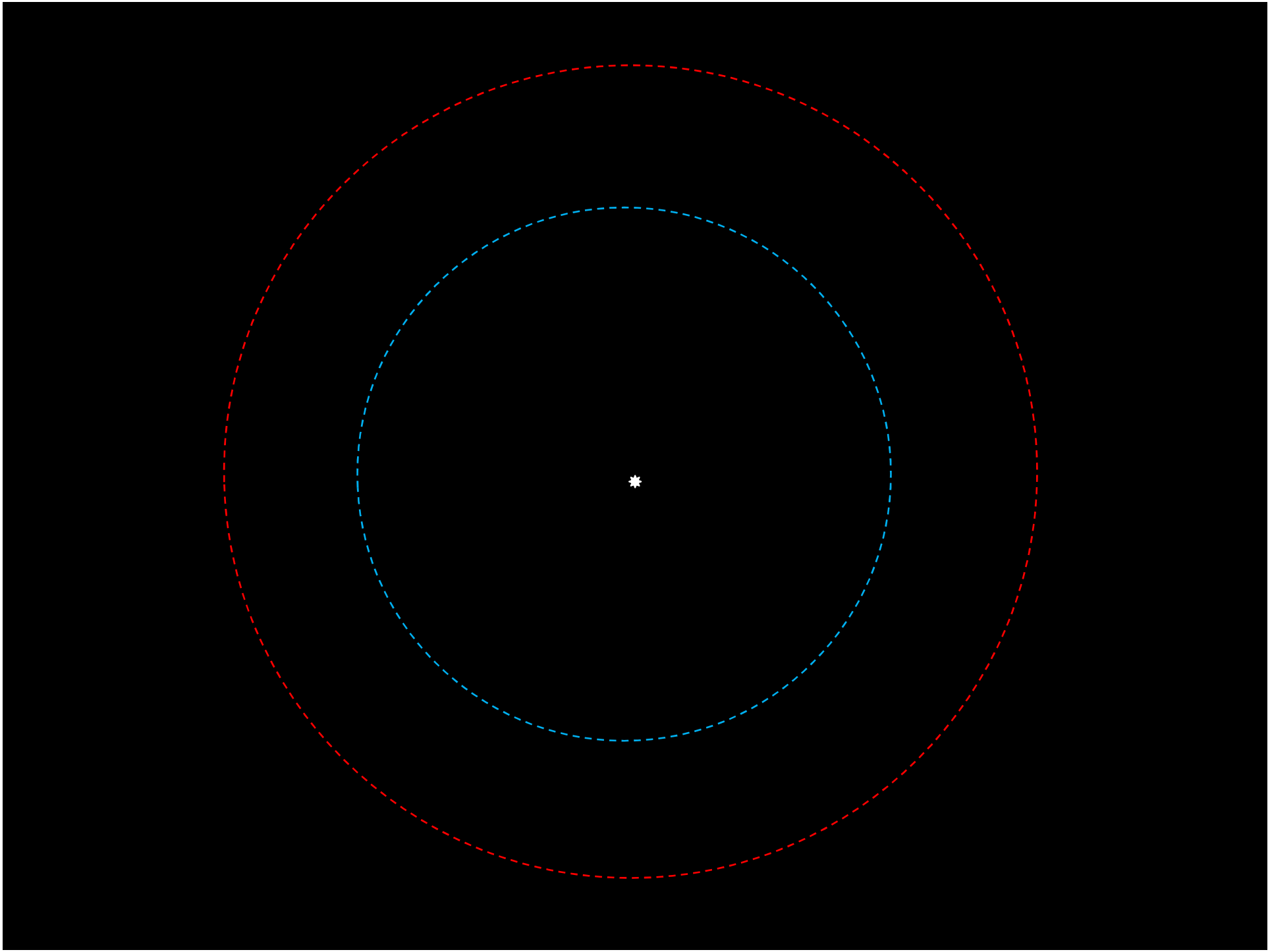


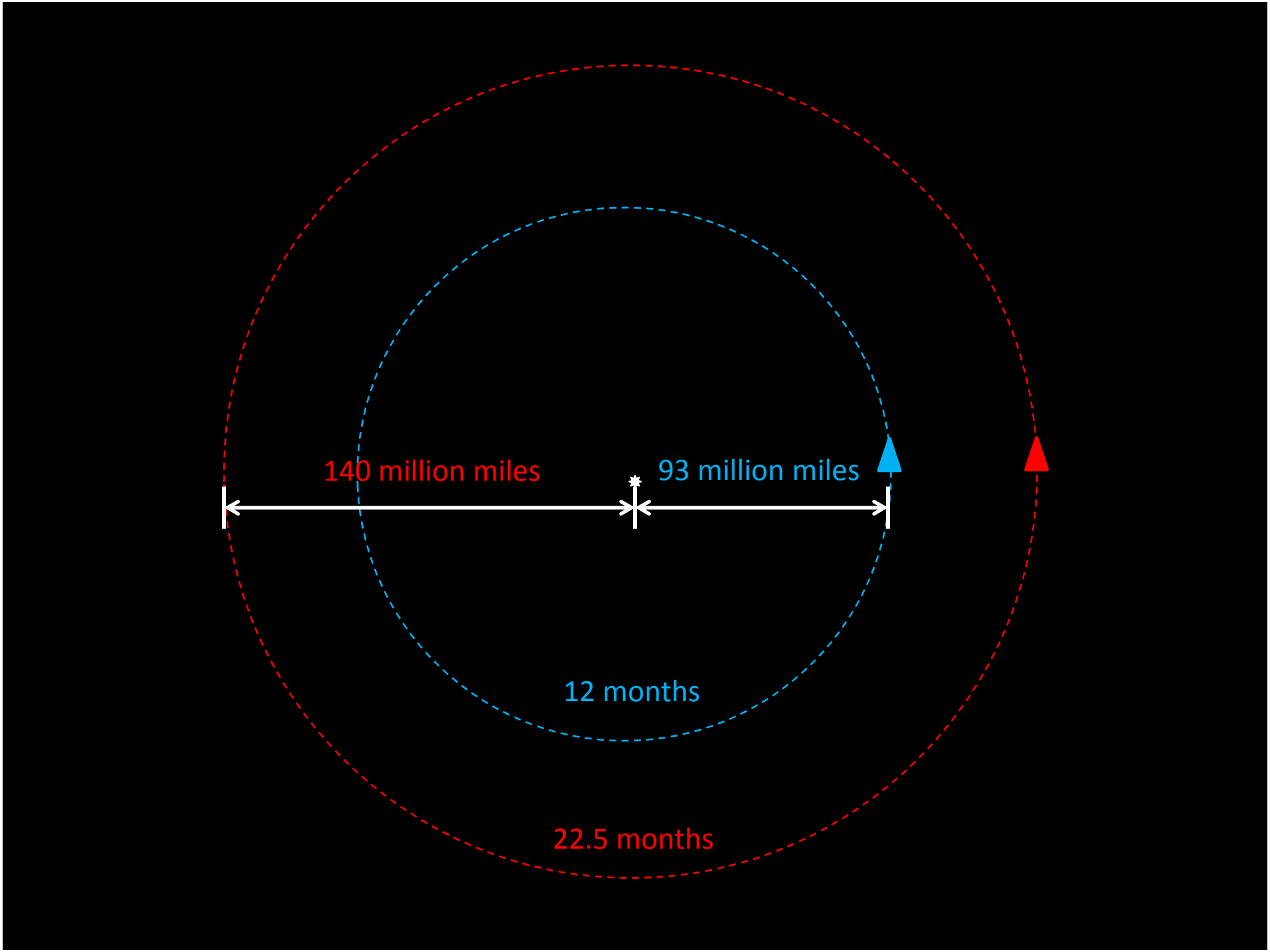


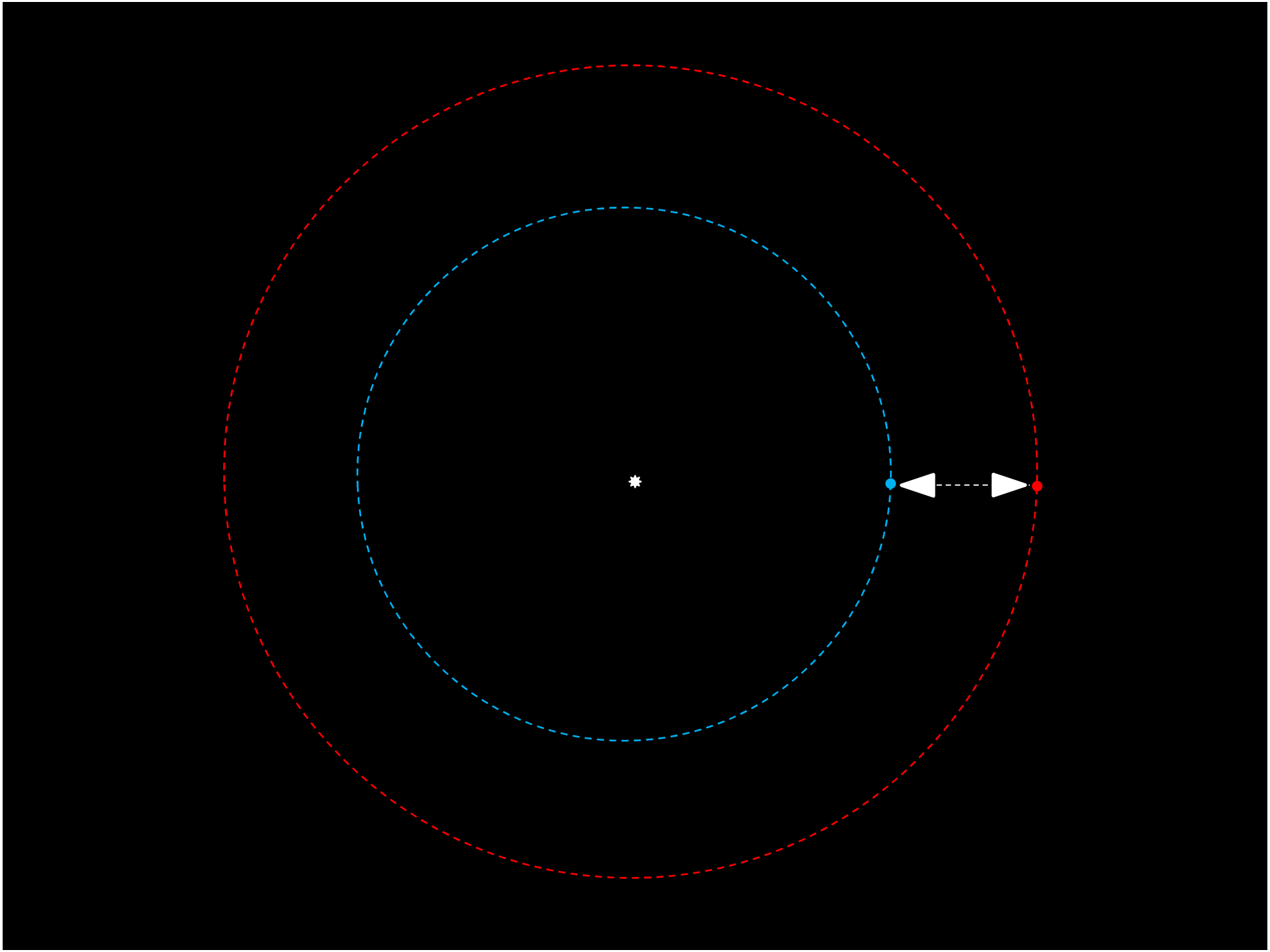




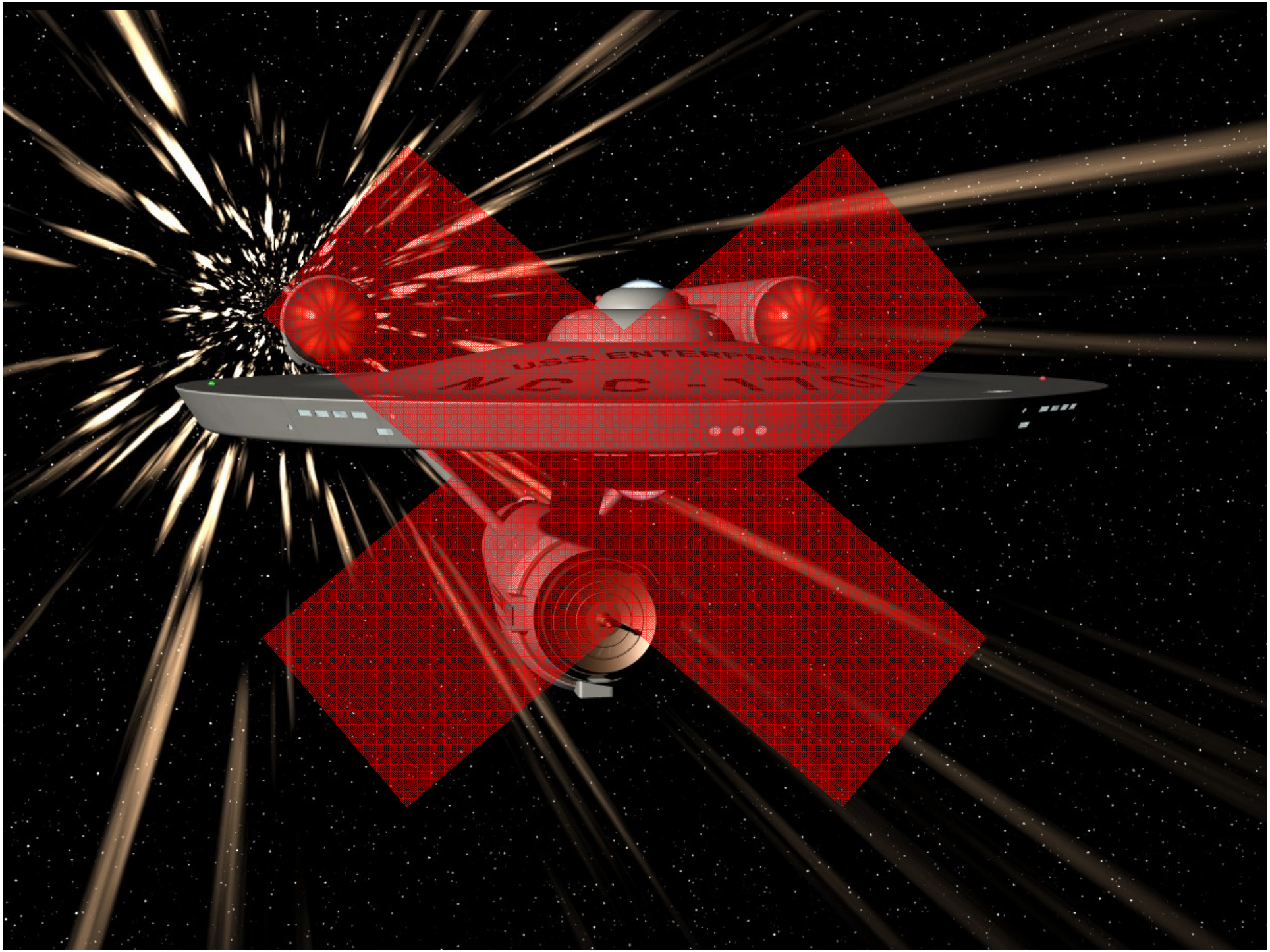


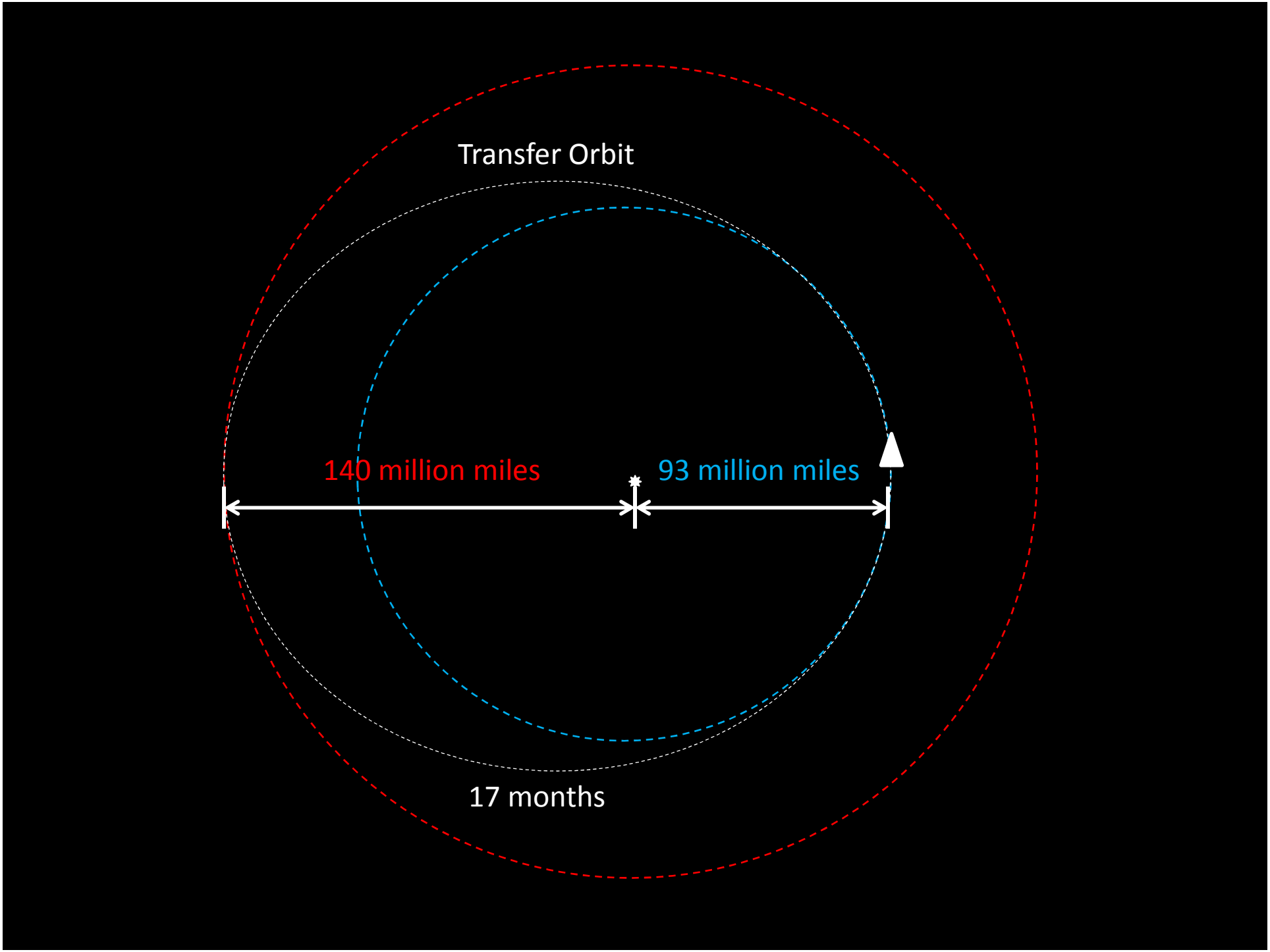


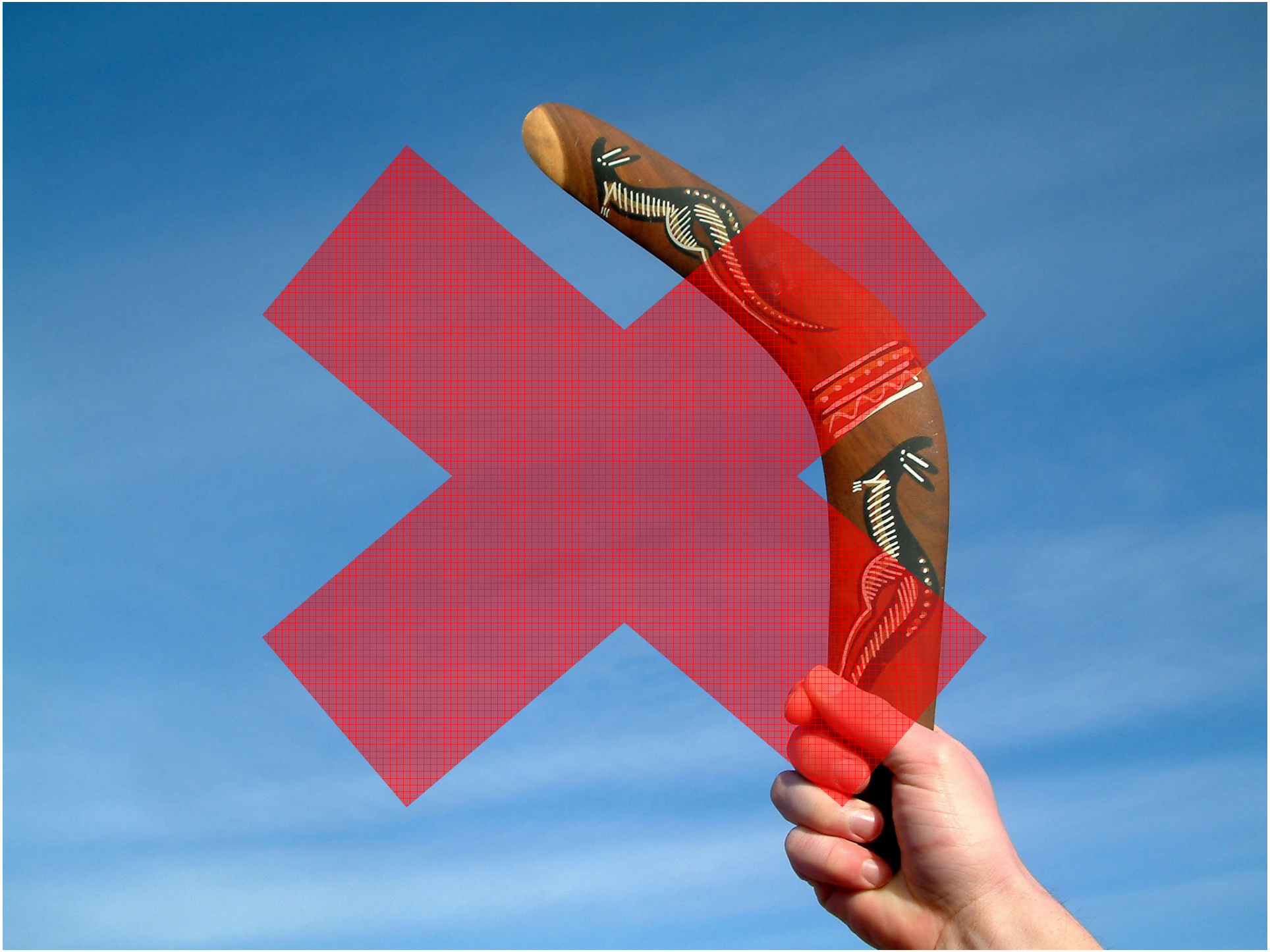

140 million miles
93 million miles
12 months
22.5 months

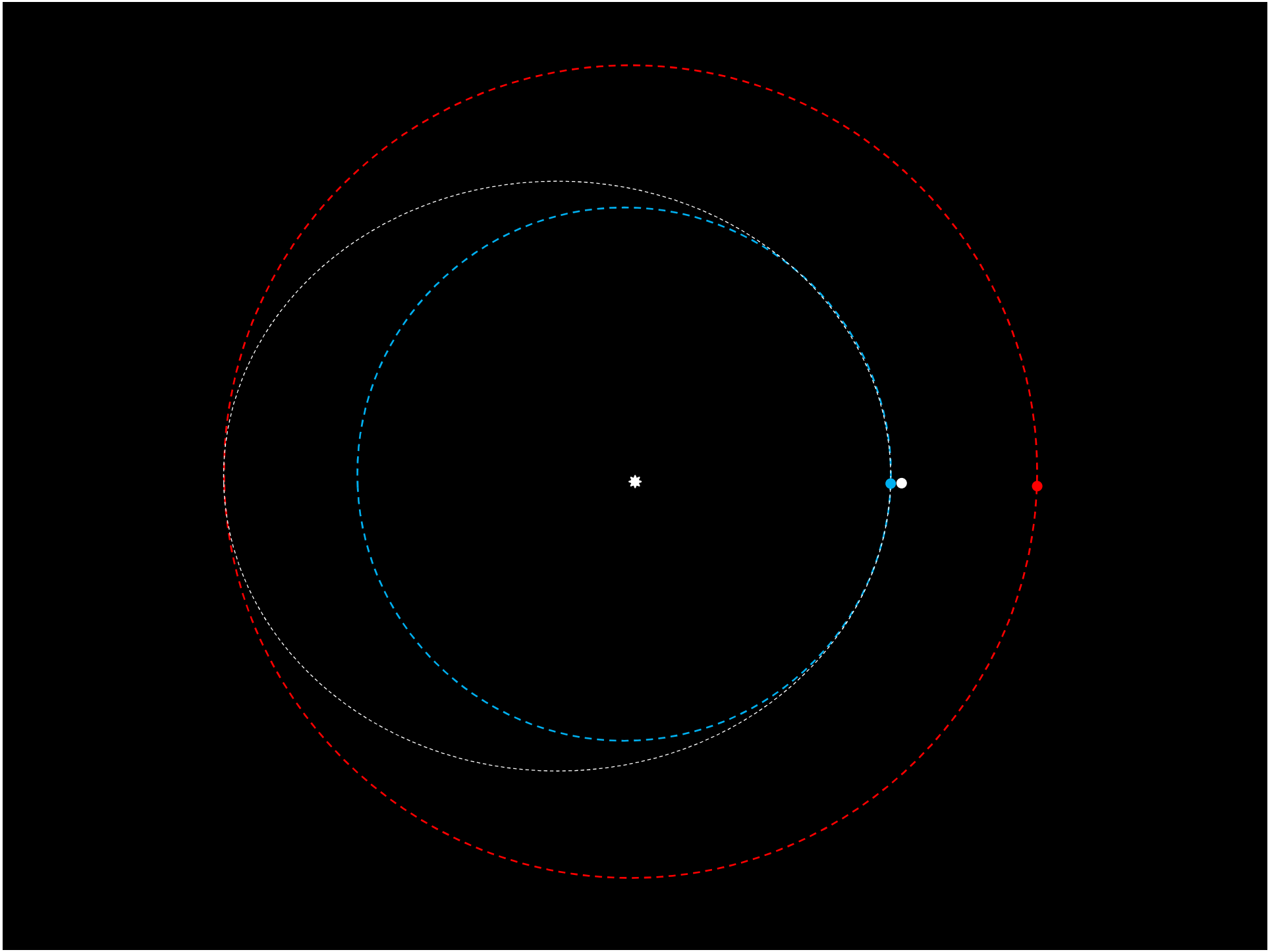


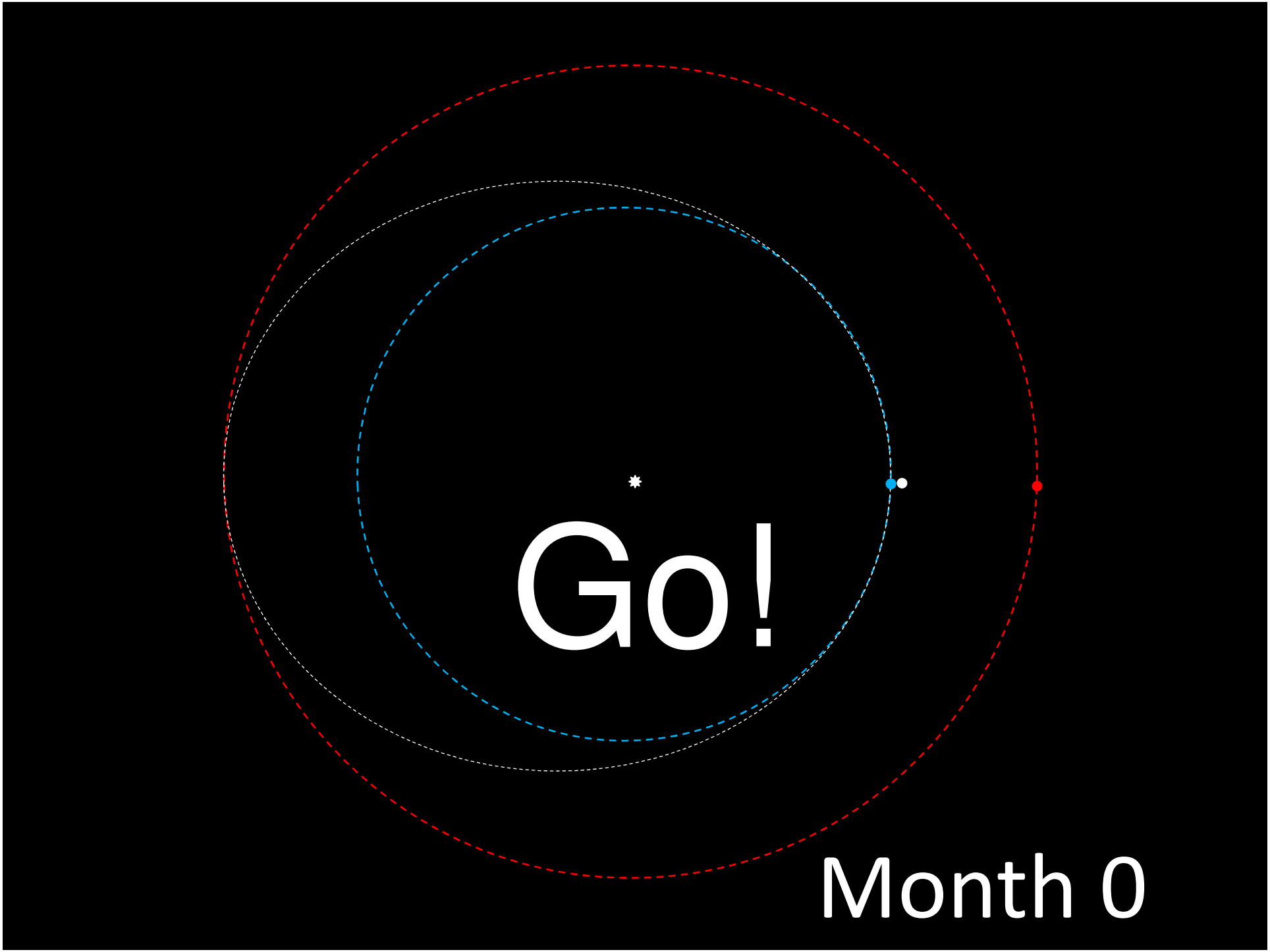
250,000+ mph

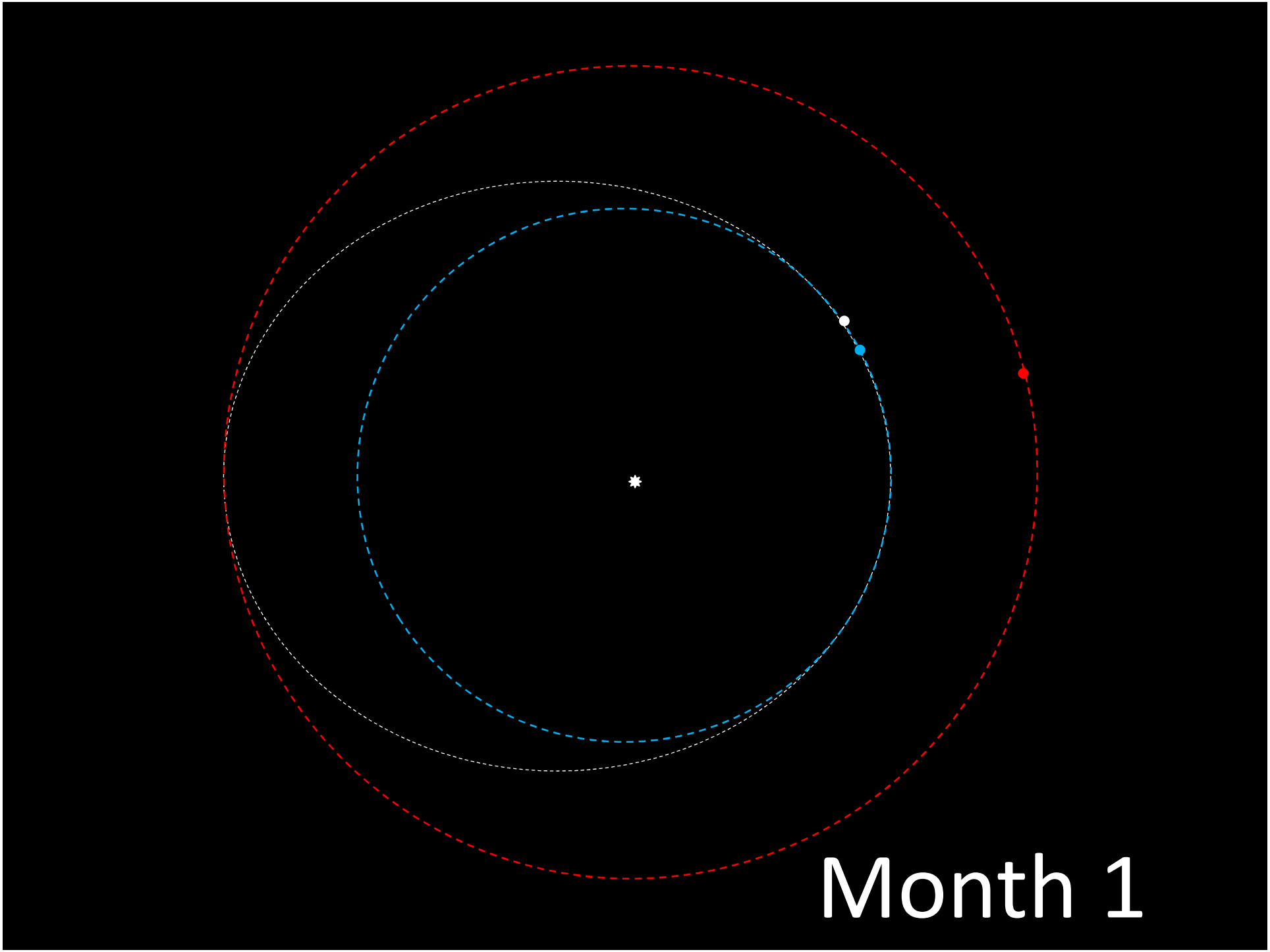

USS ENTERPRISE
NCC-1701

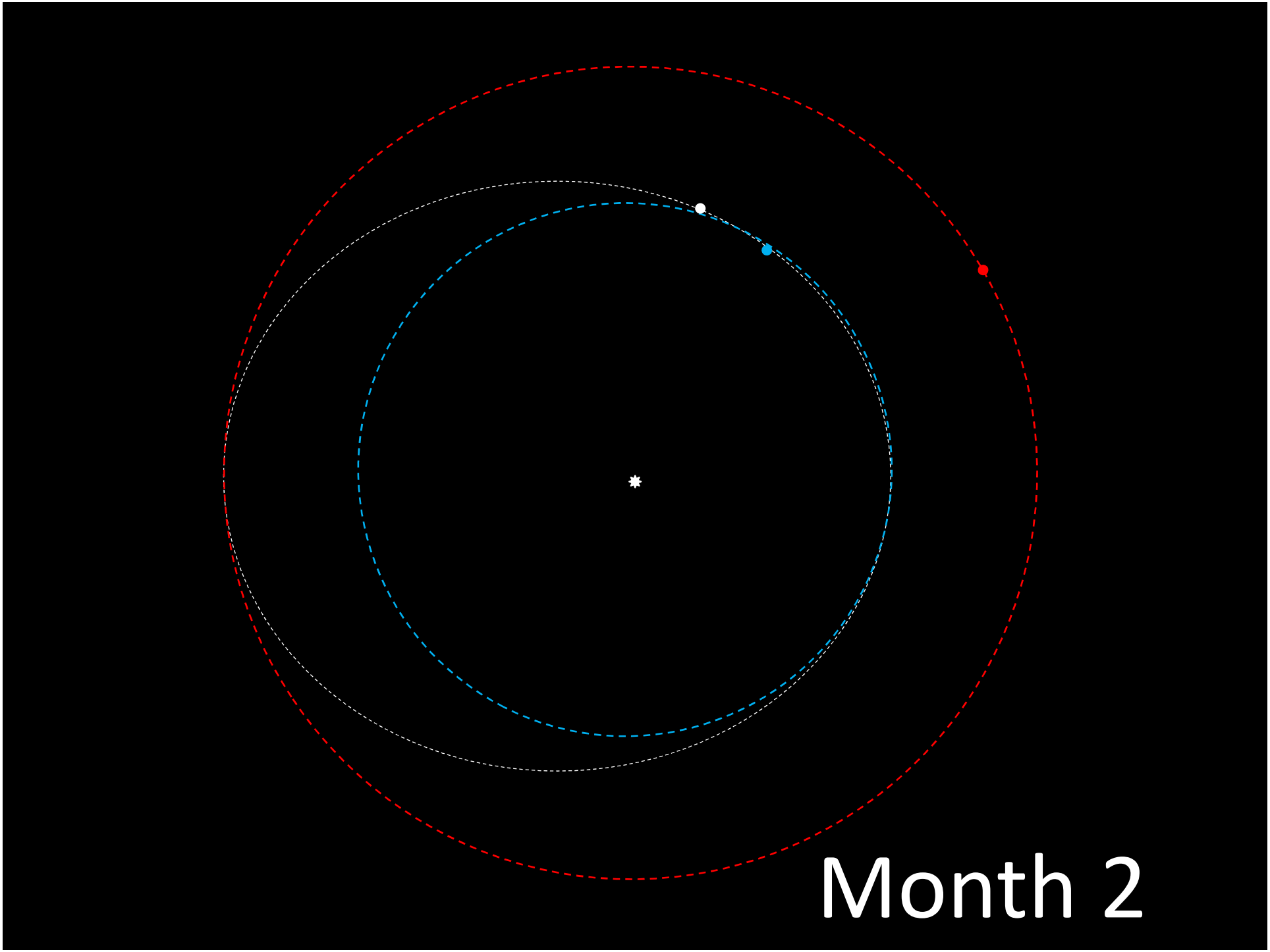

Transfer Orbit
140 million miles
93 million miles
17 months

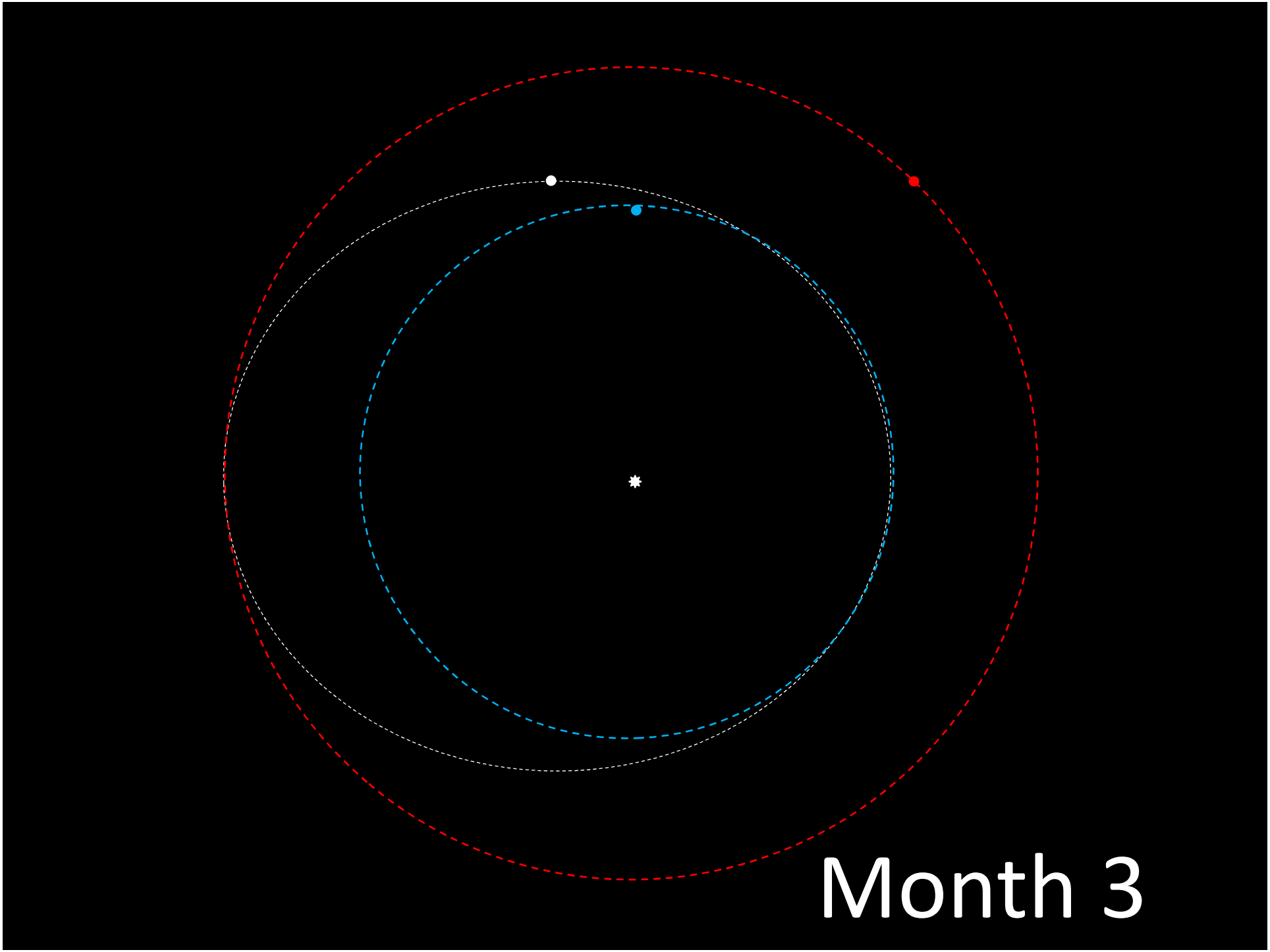


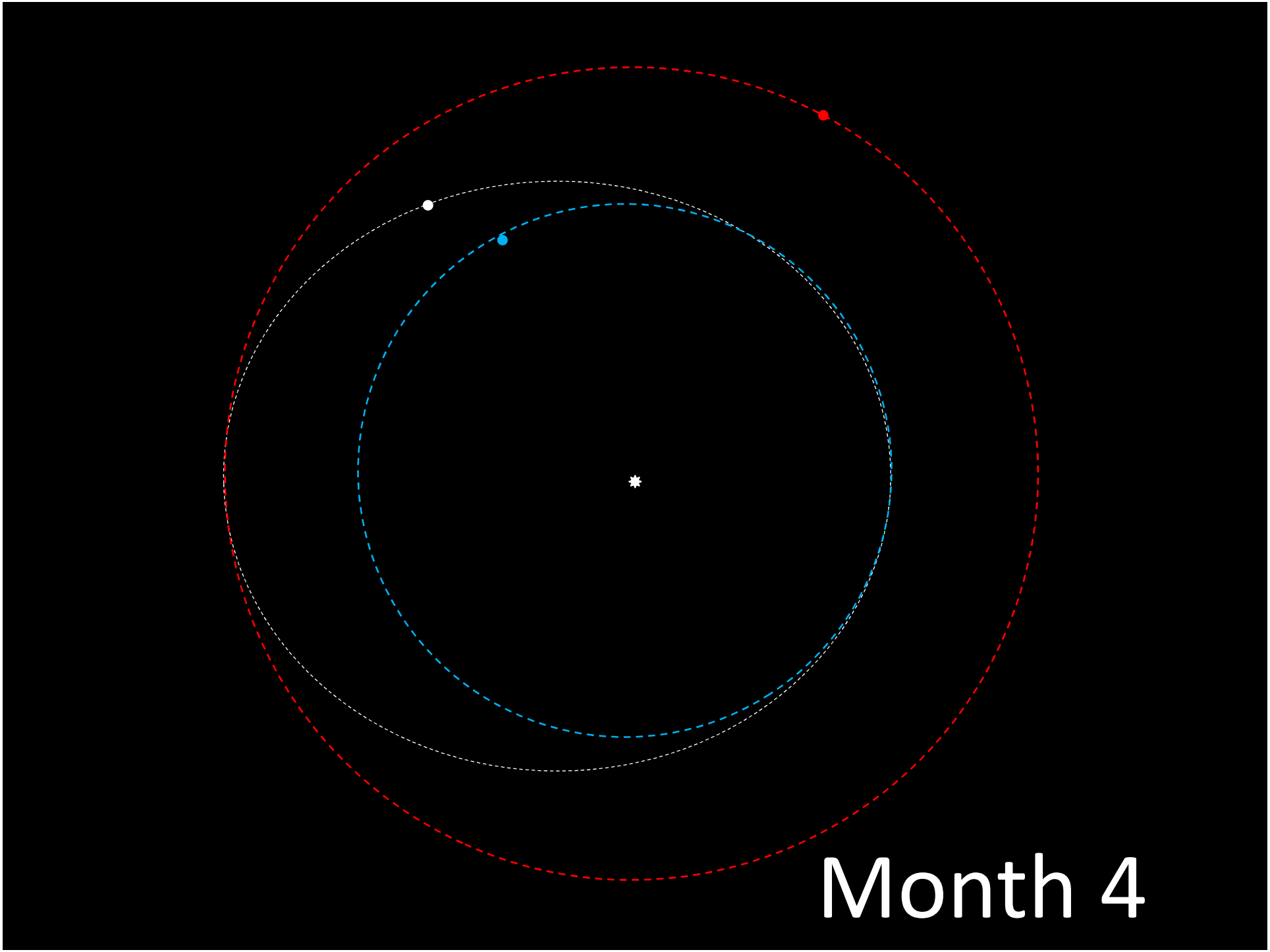


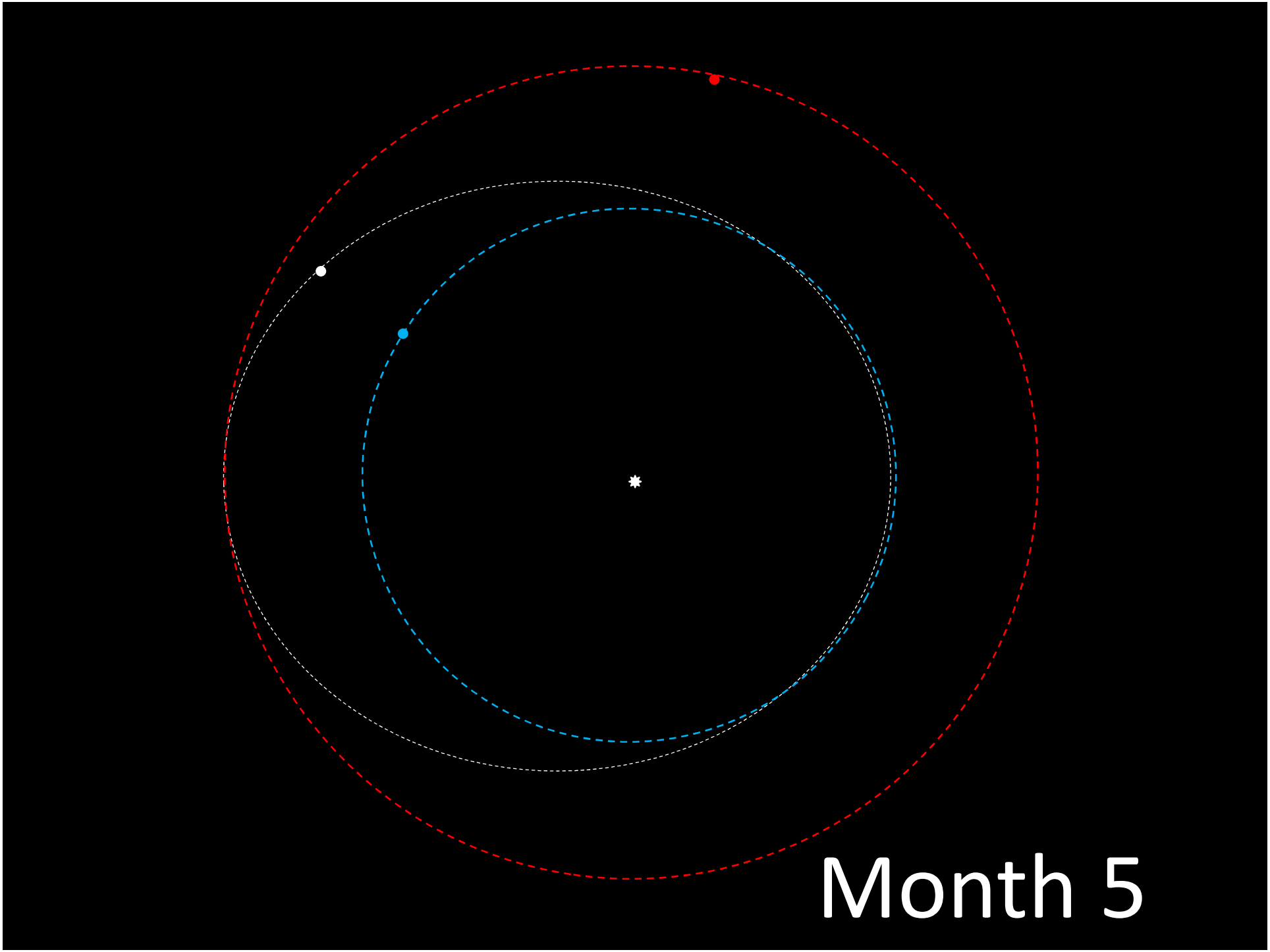

Go!
Month 0

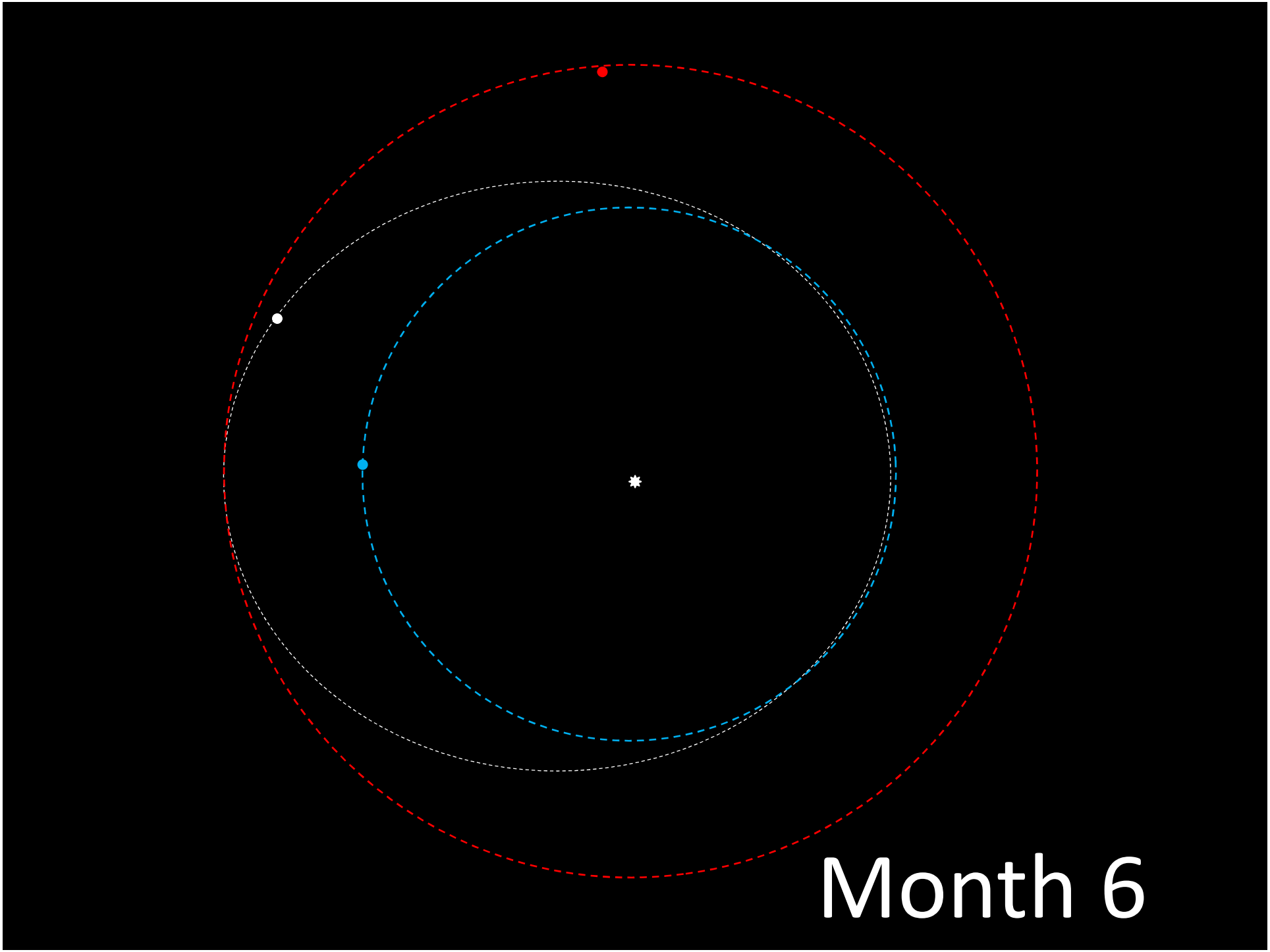

Month 1

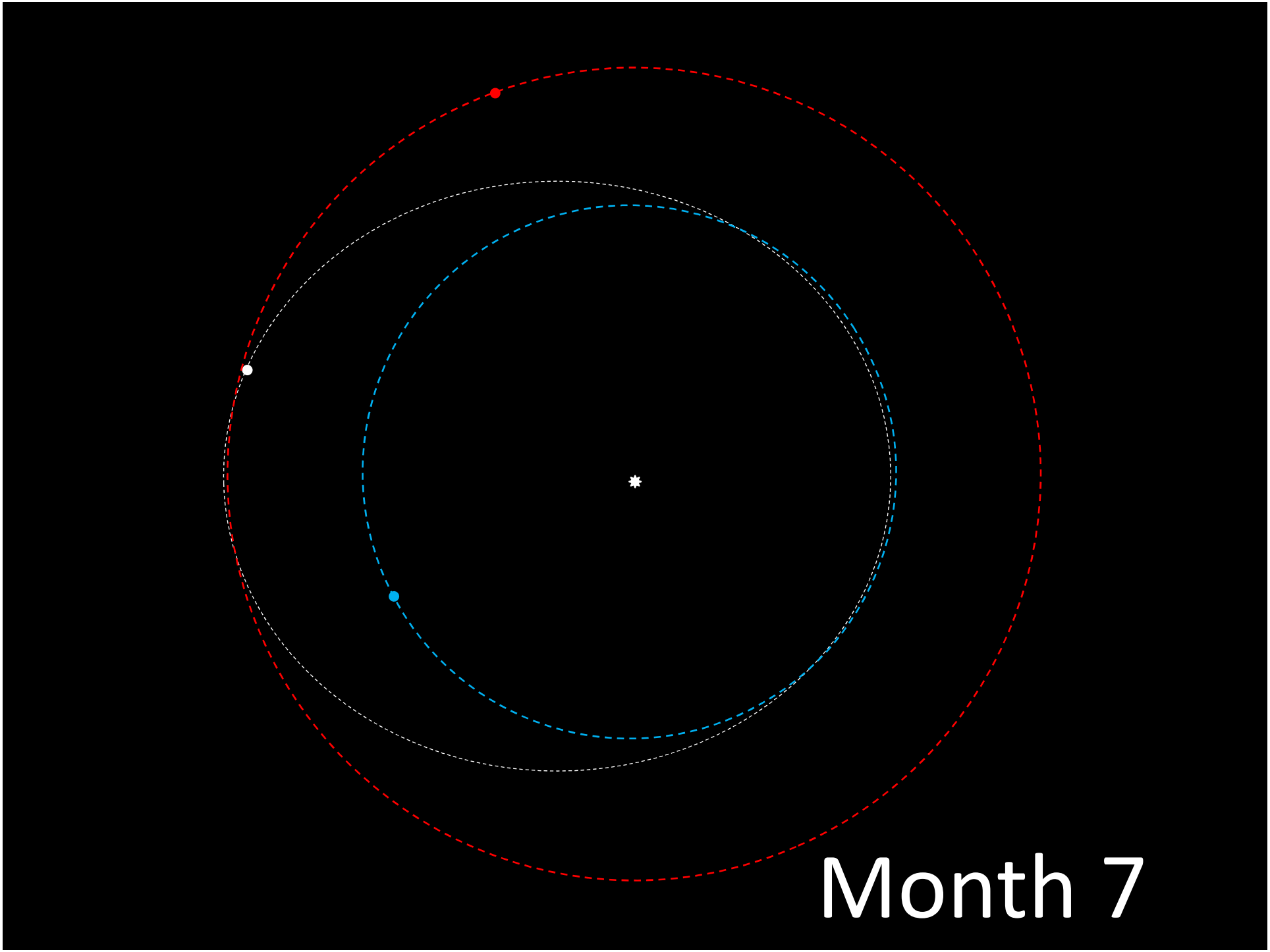

Month 2


Month 3


Month 4


Month 5


Month 6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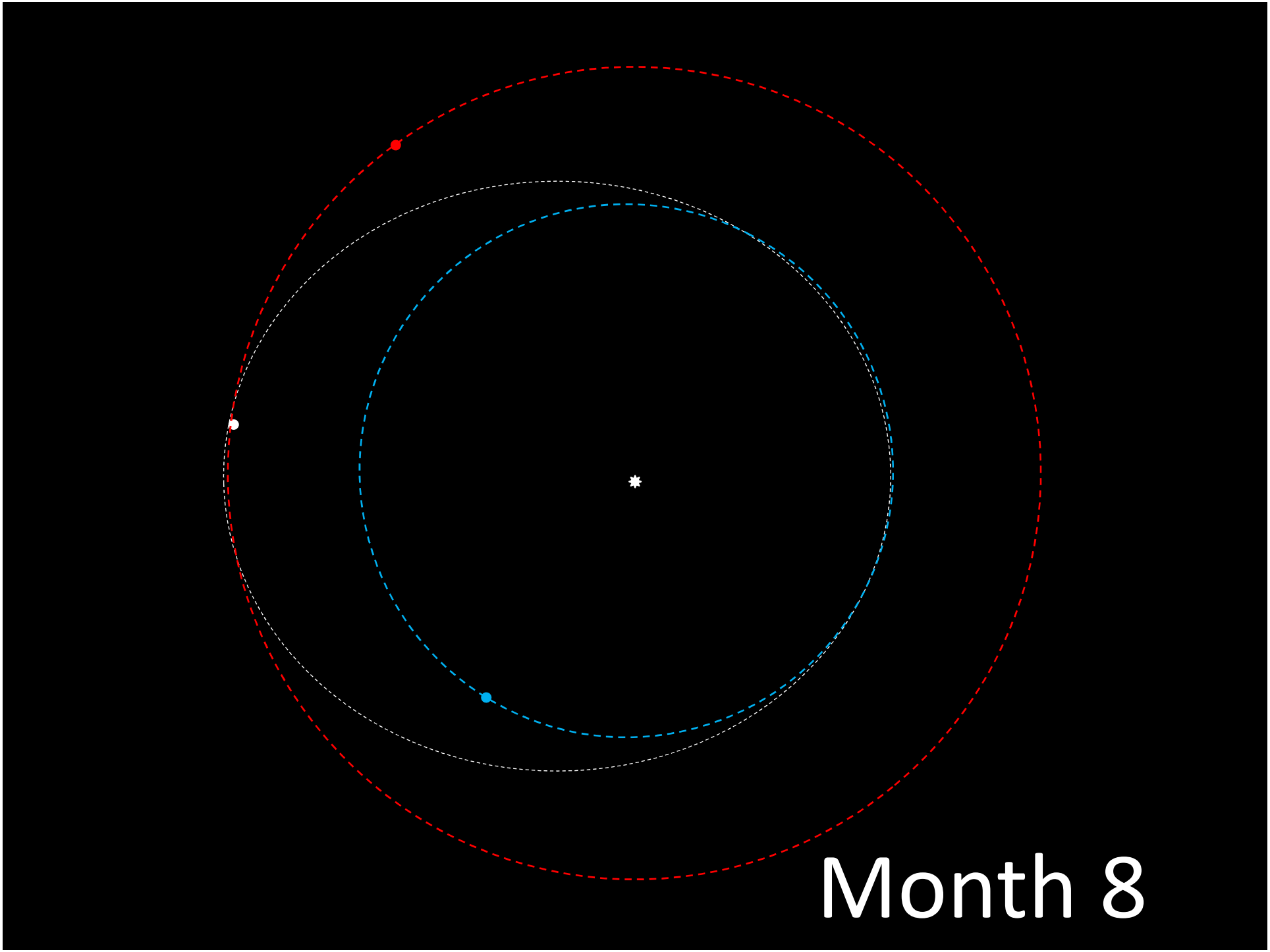
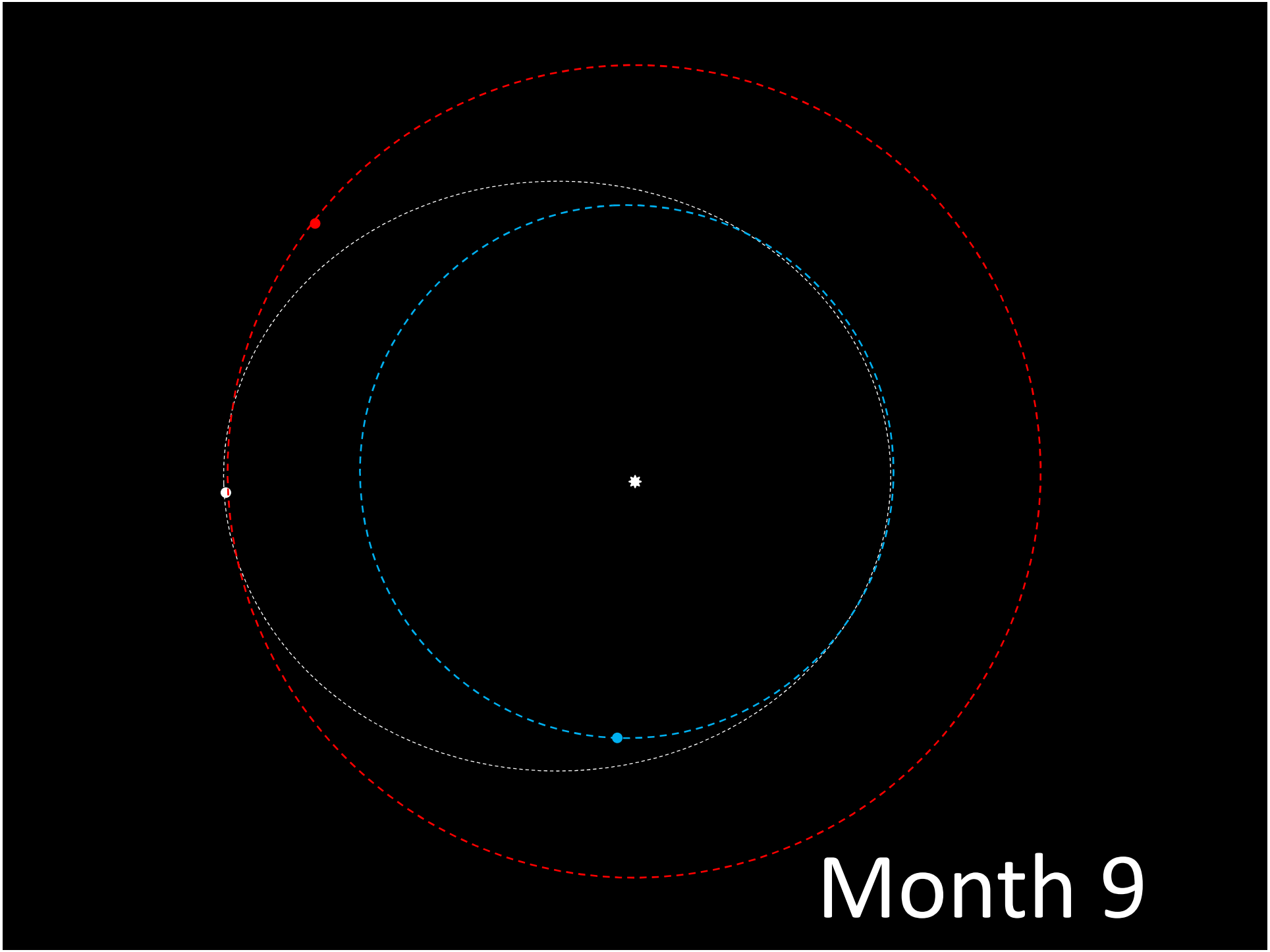

Month 8

Now we're embarrassed.
Month 8.5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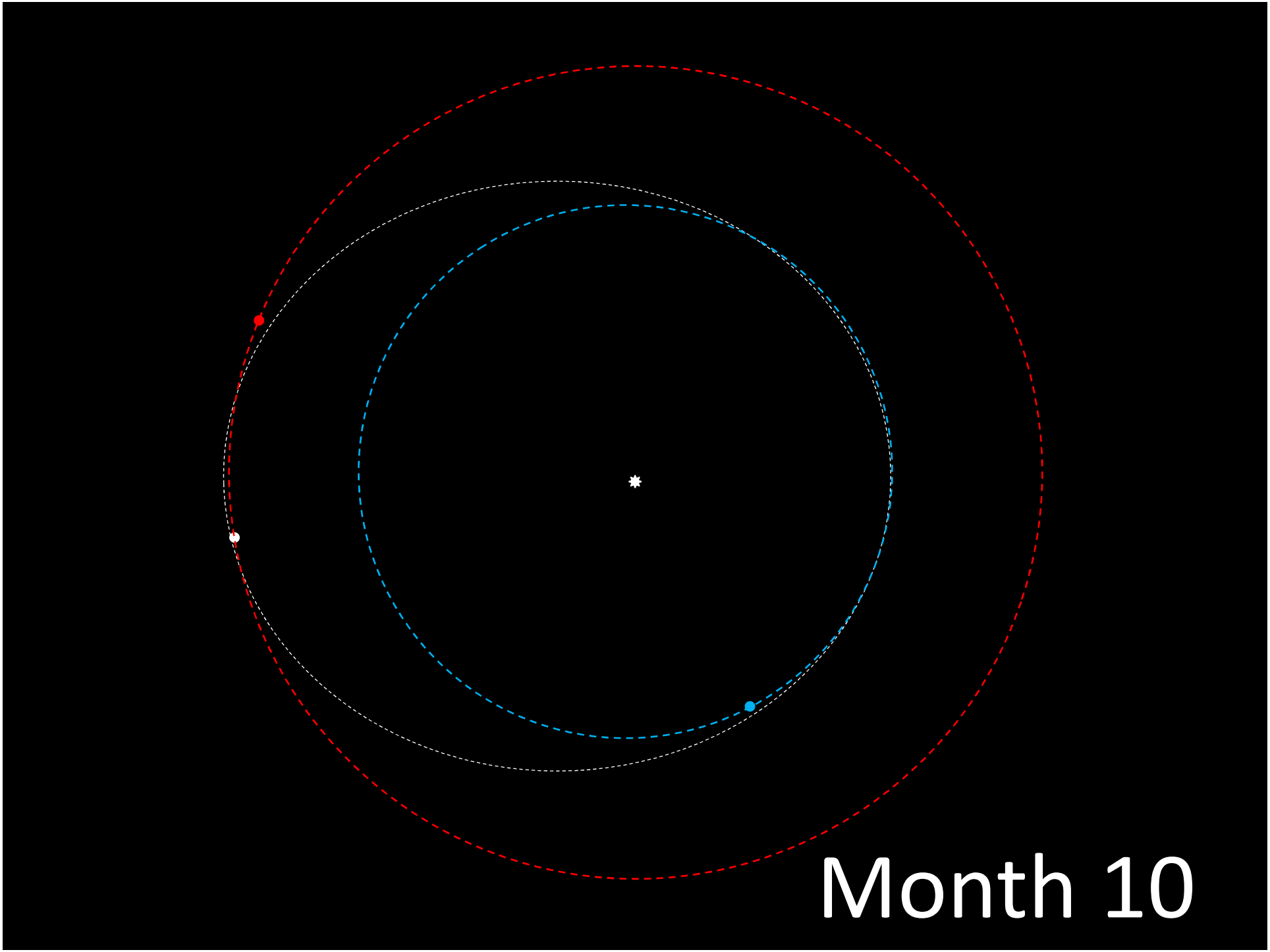
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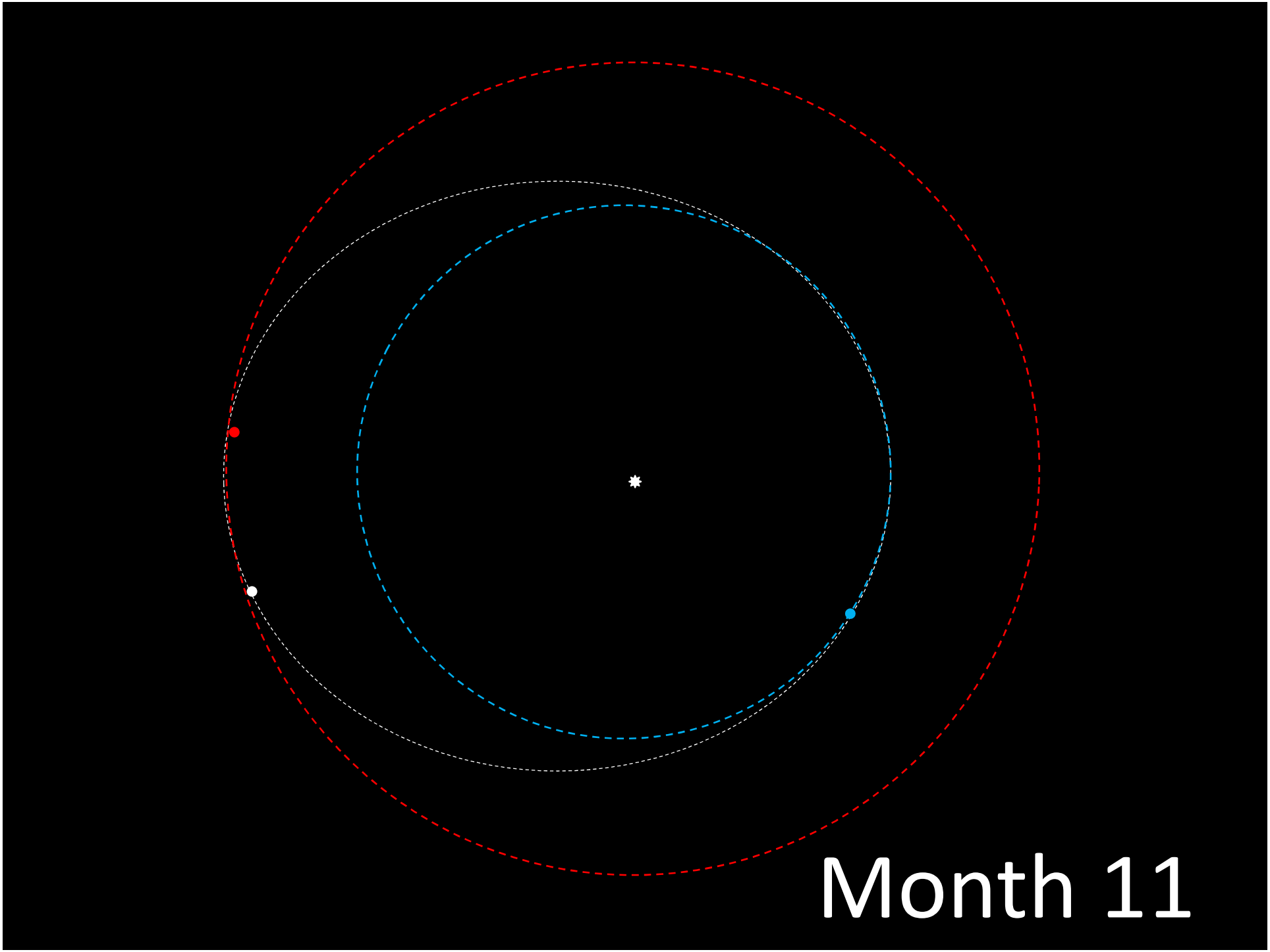
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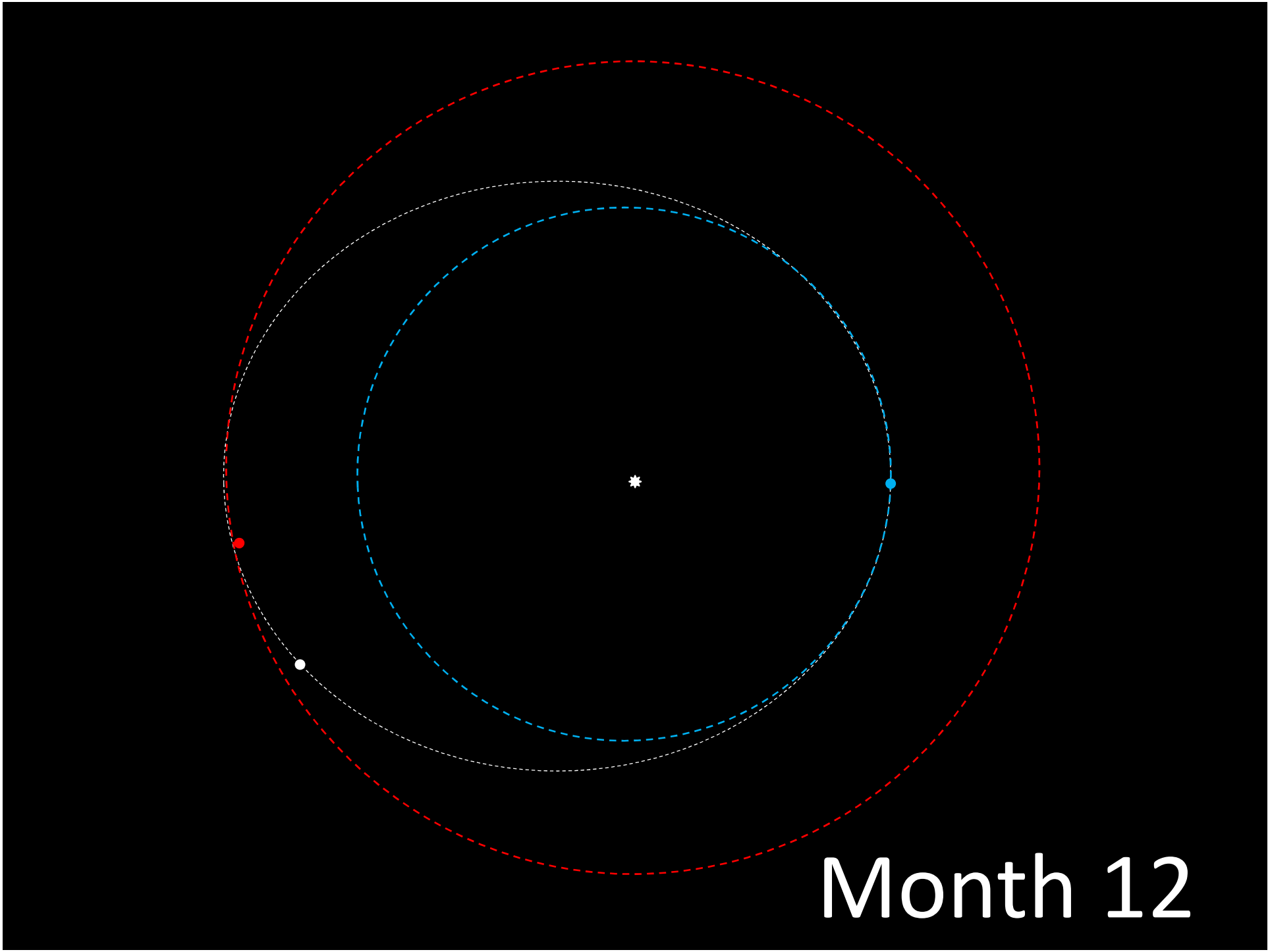
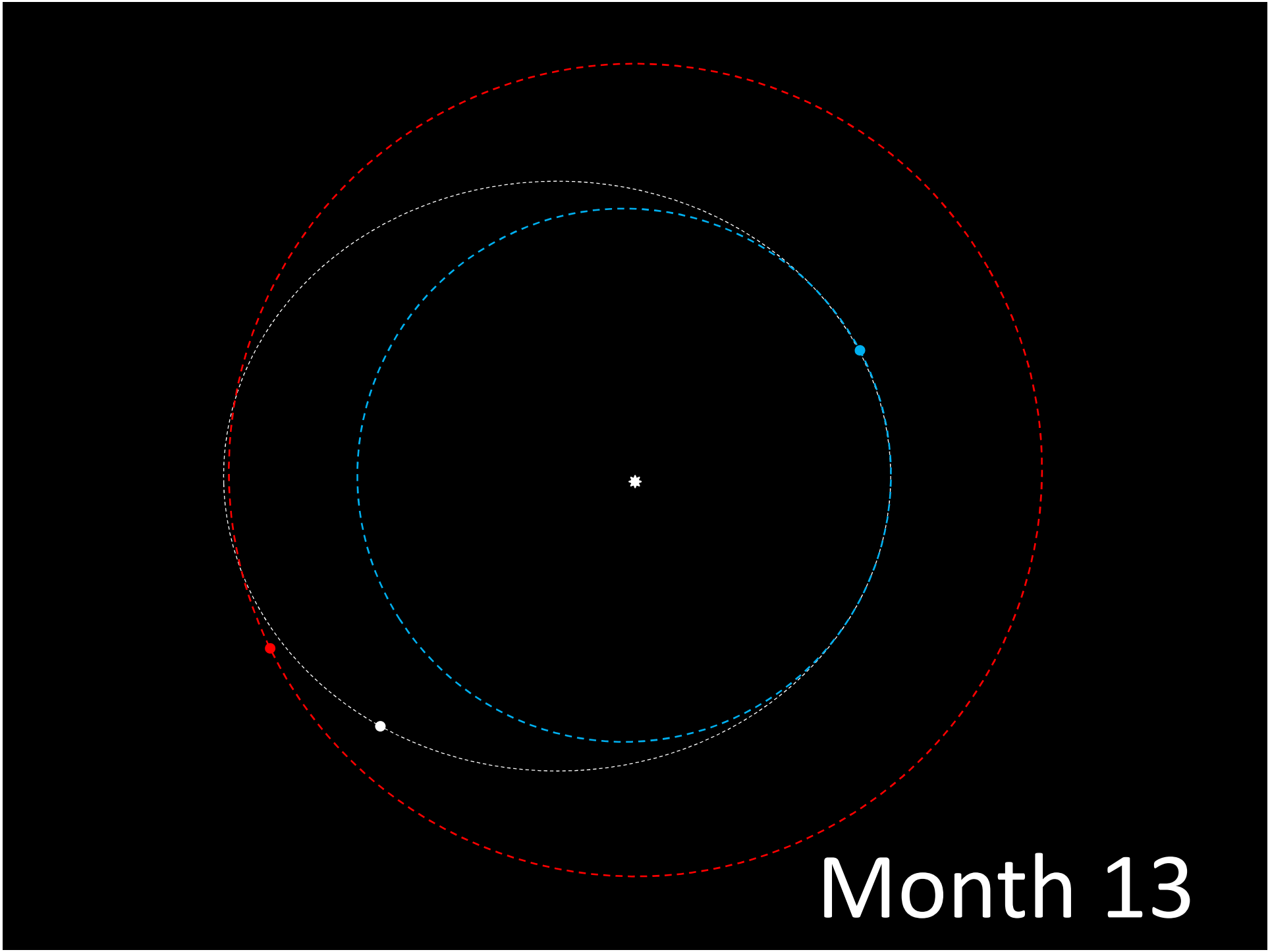

Month 12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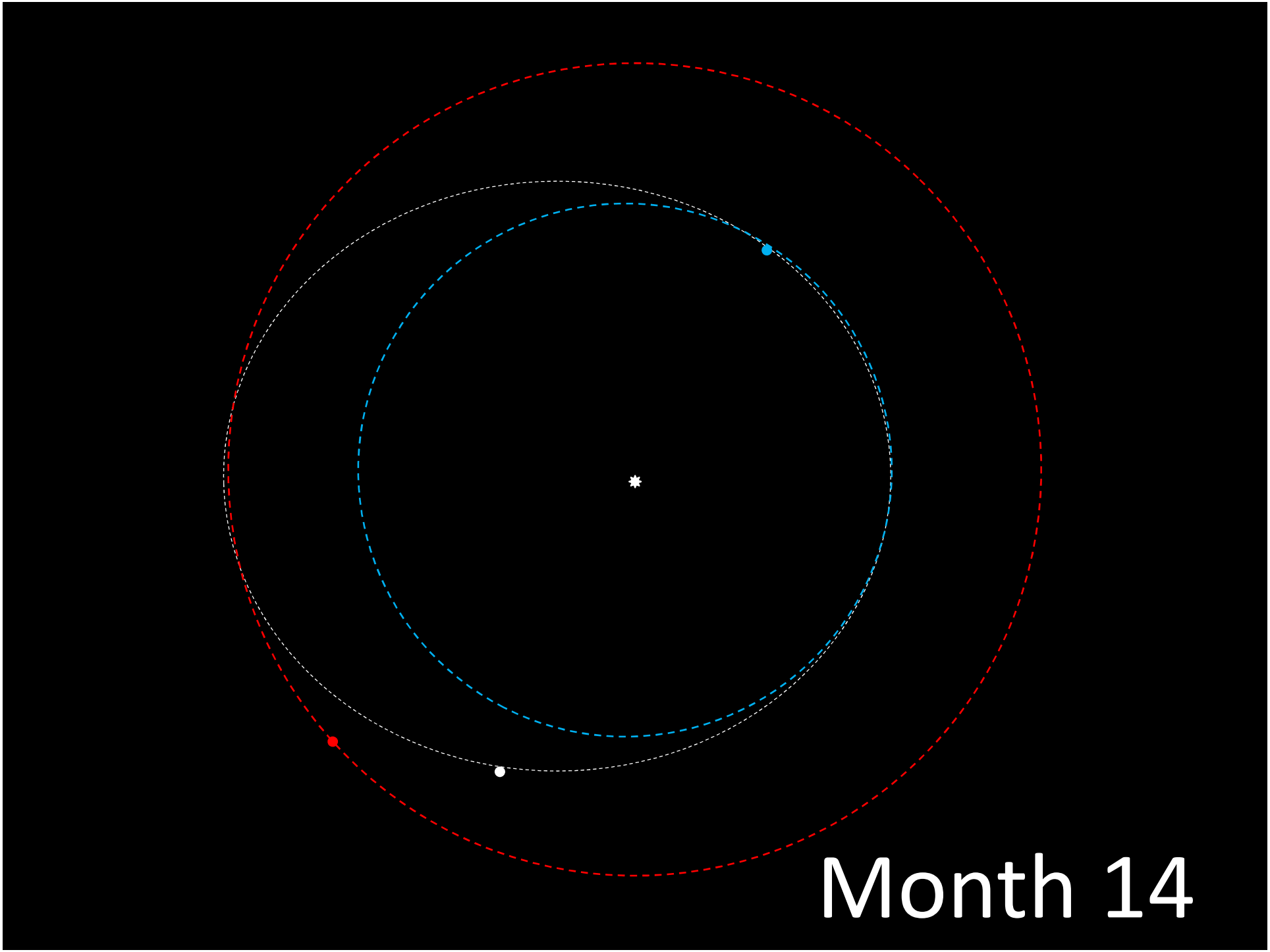
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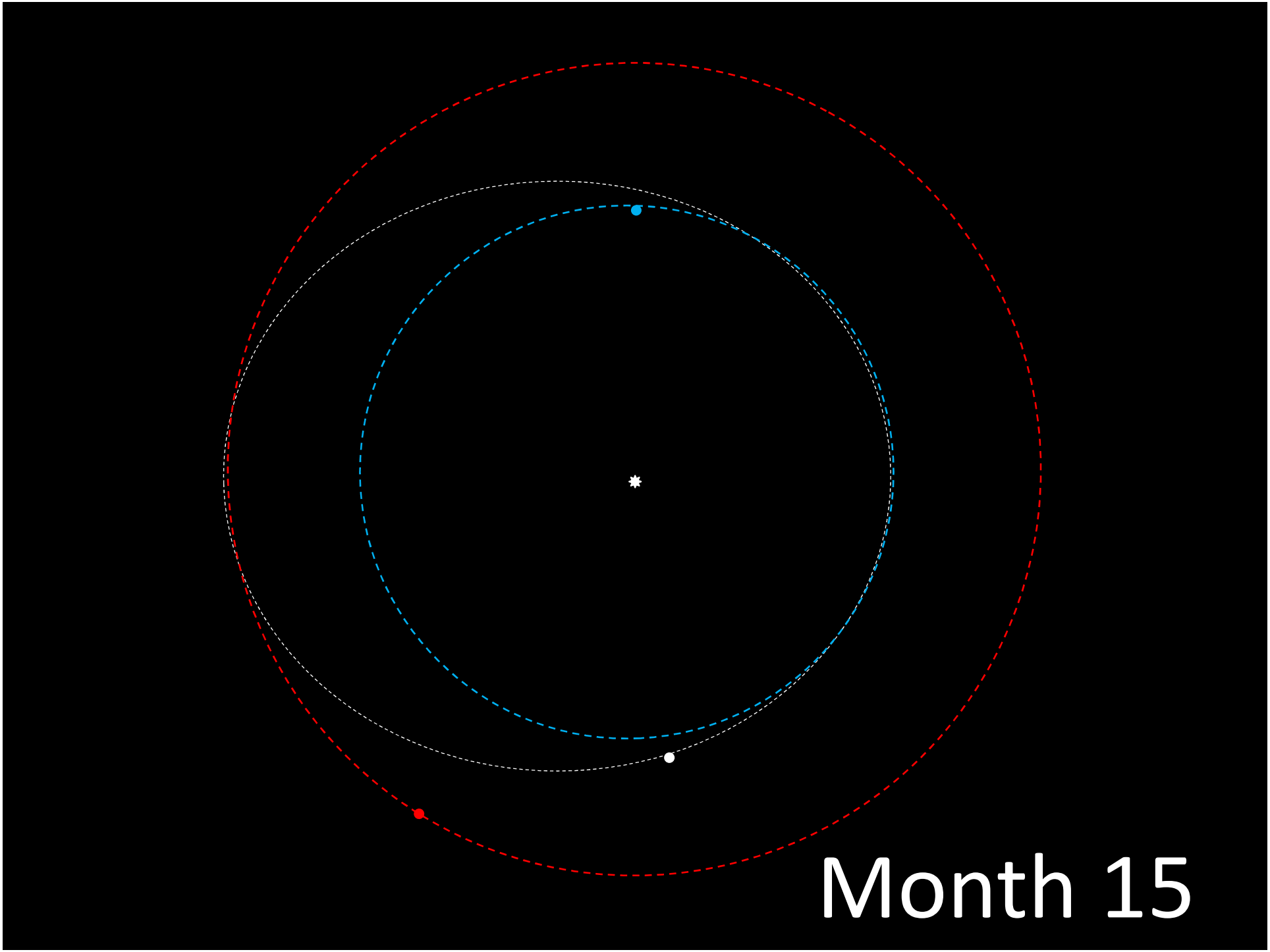
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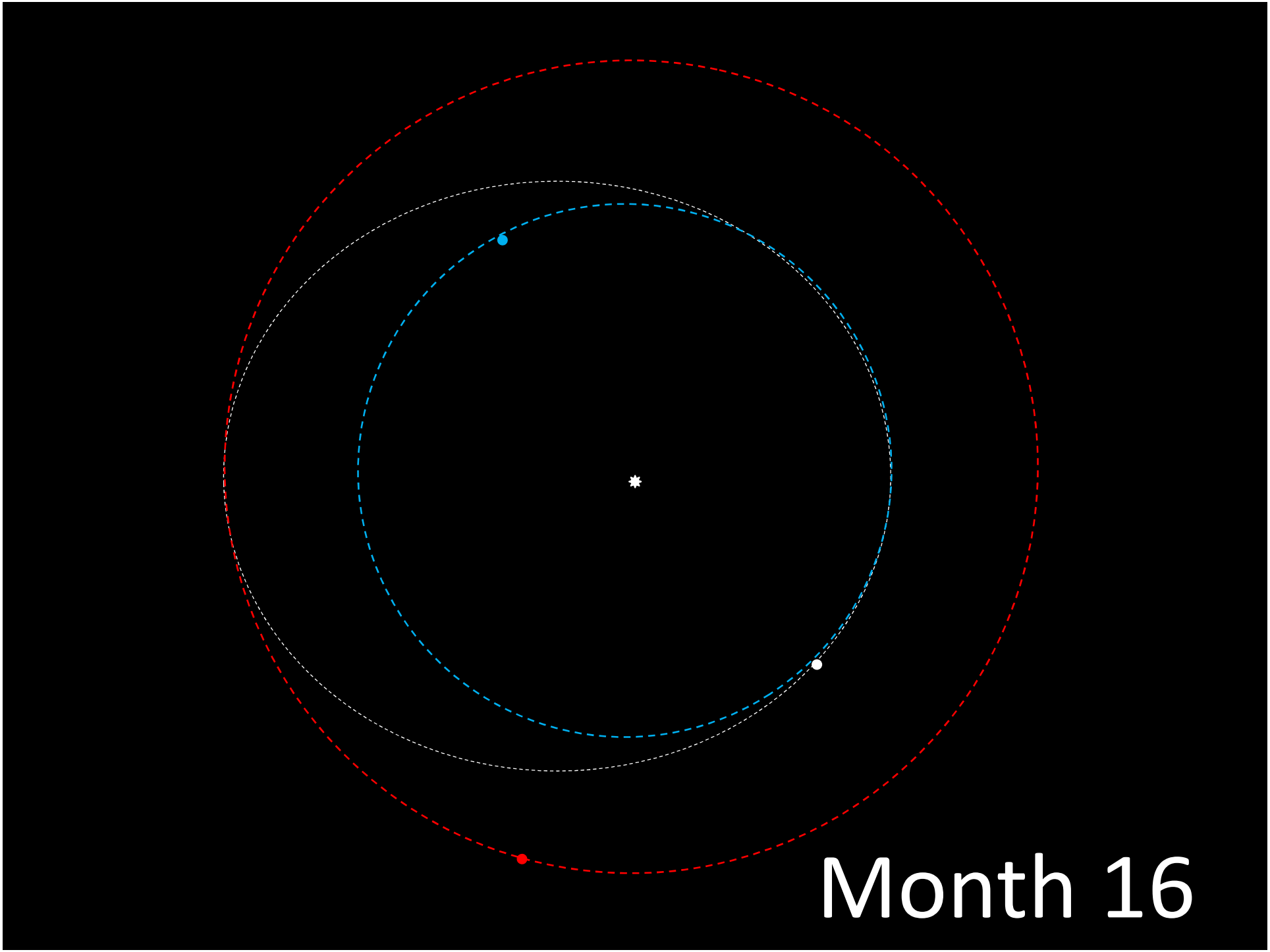
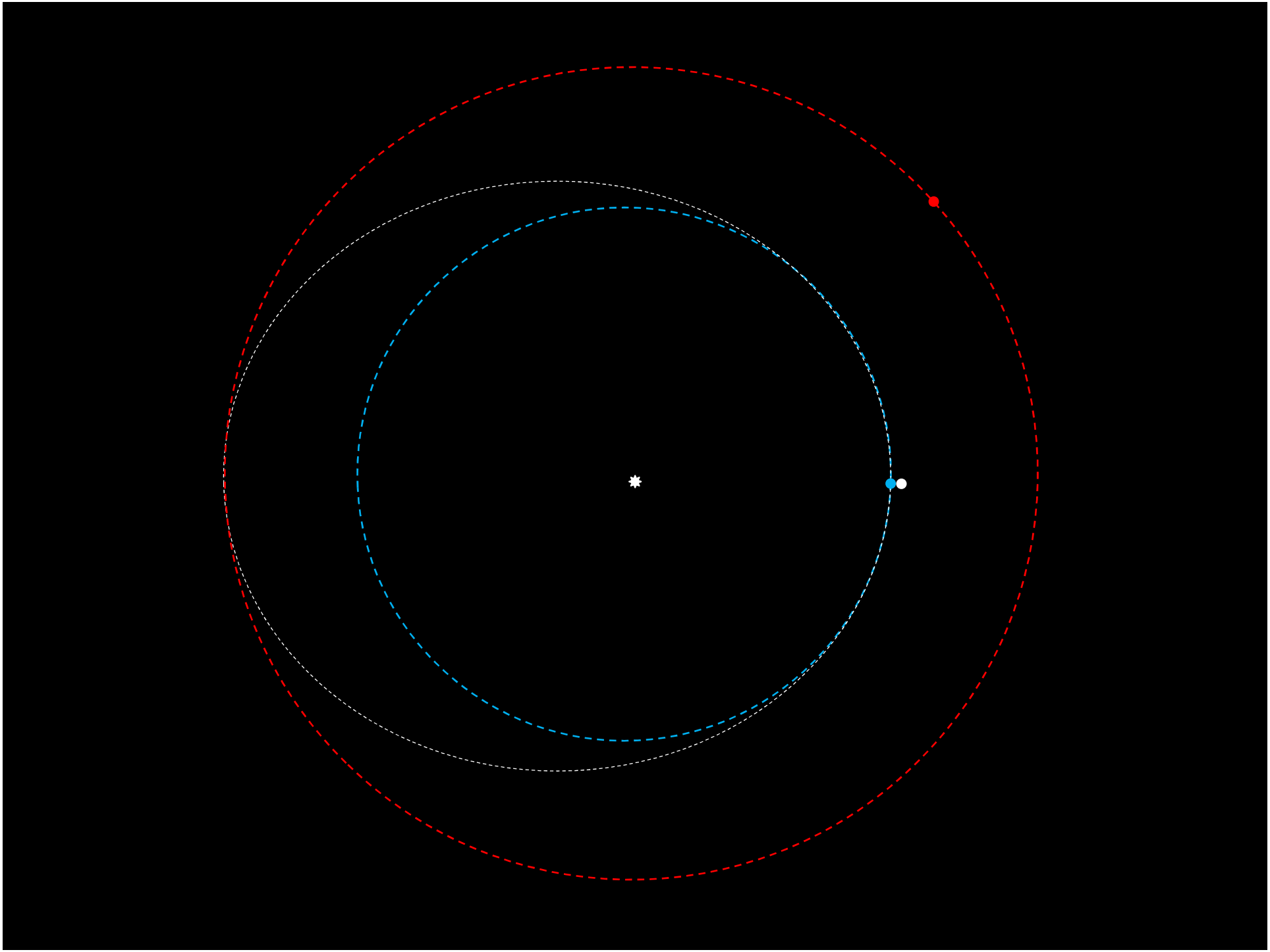
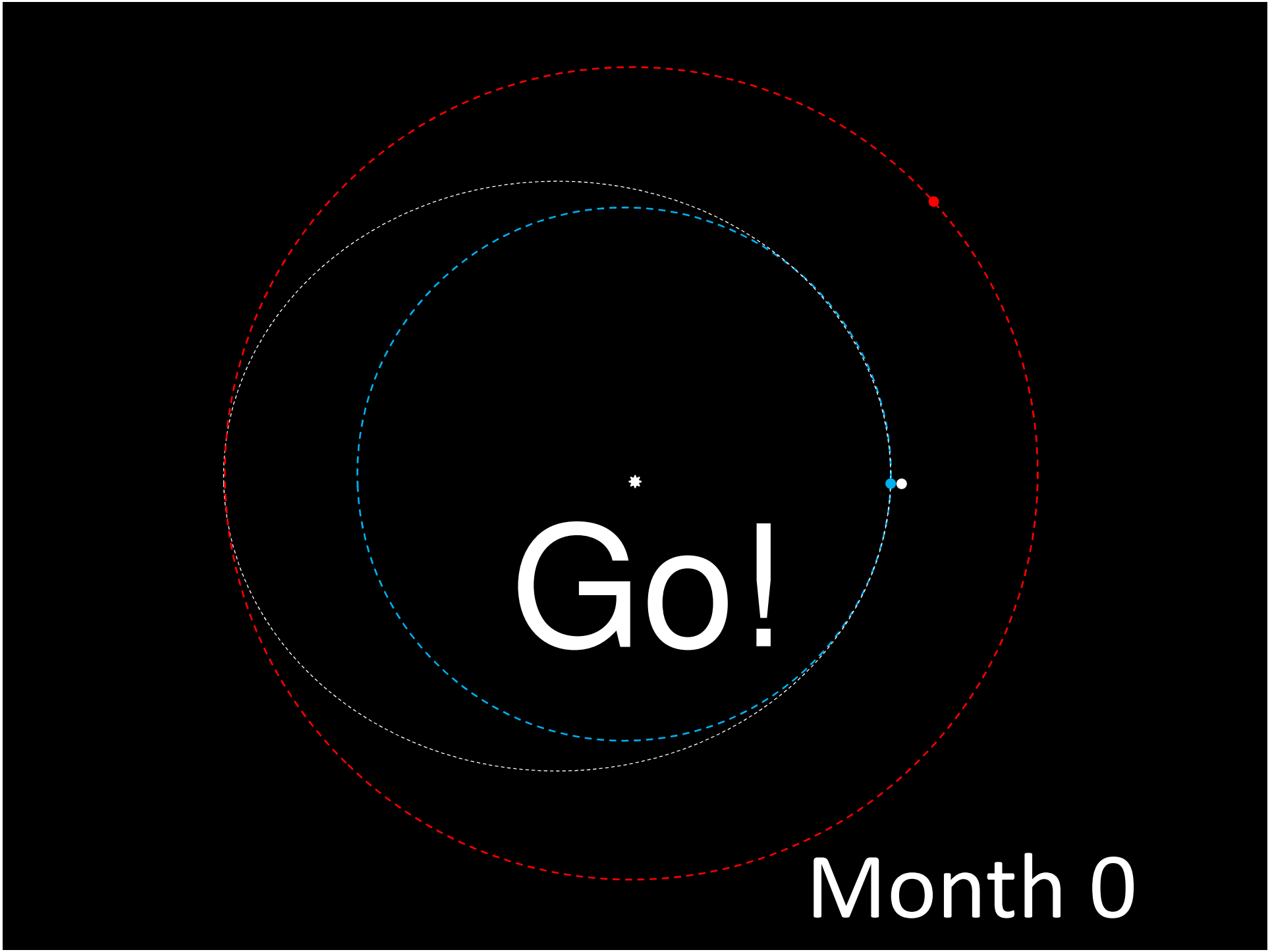
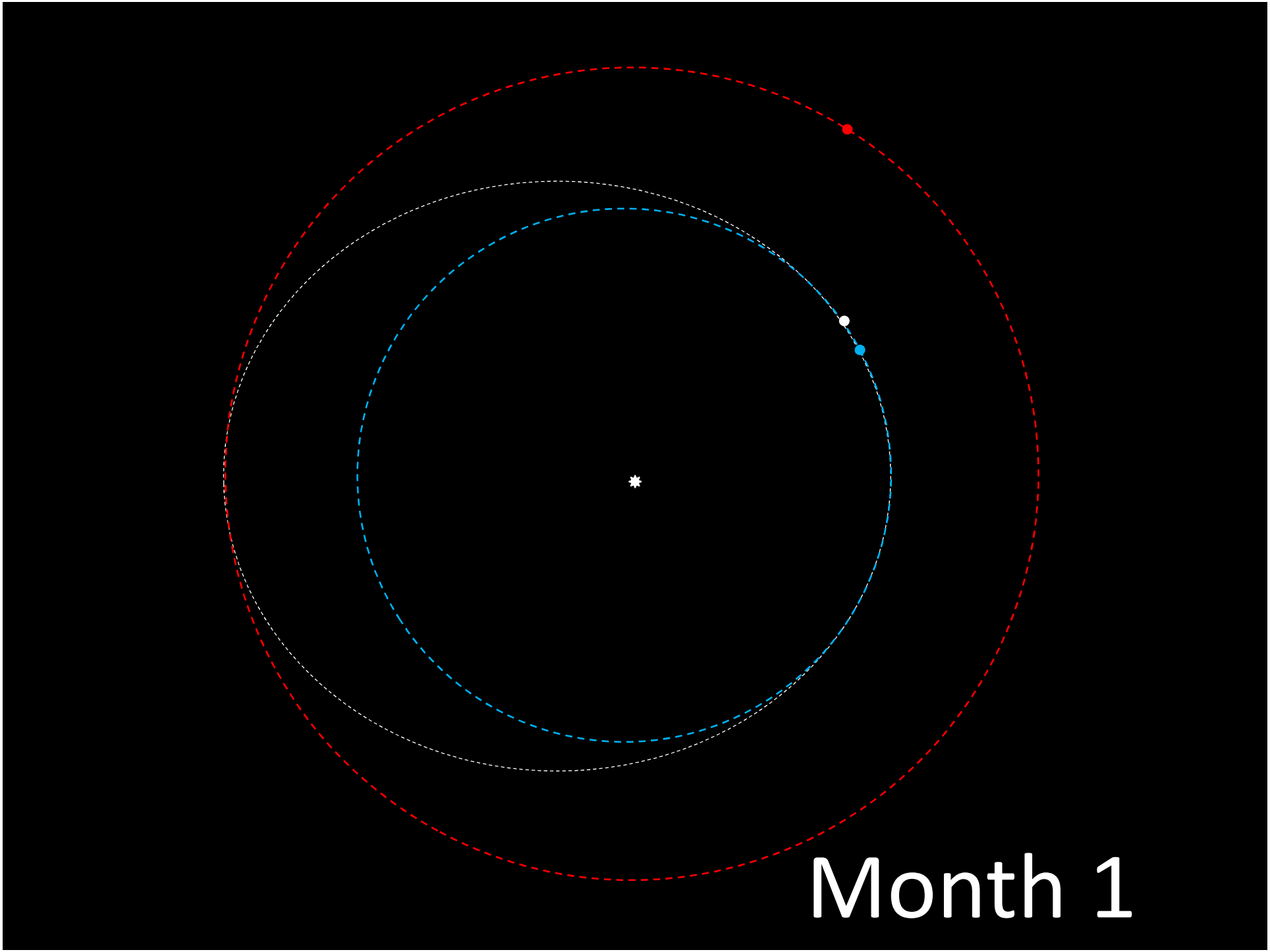

Month 16

Now we're dead.
Month 17




Go!
Month 0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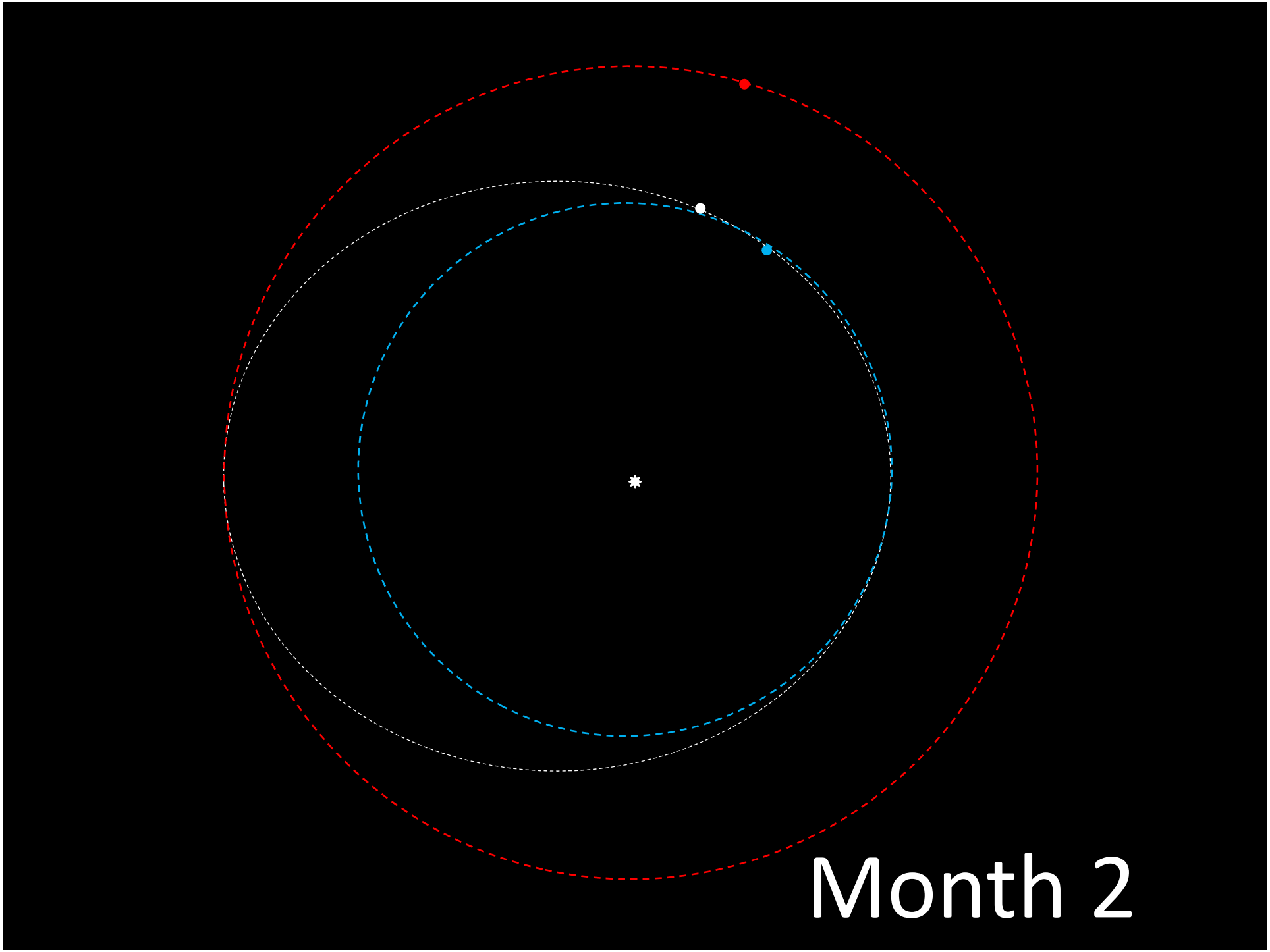
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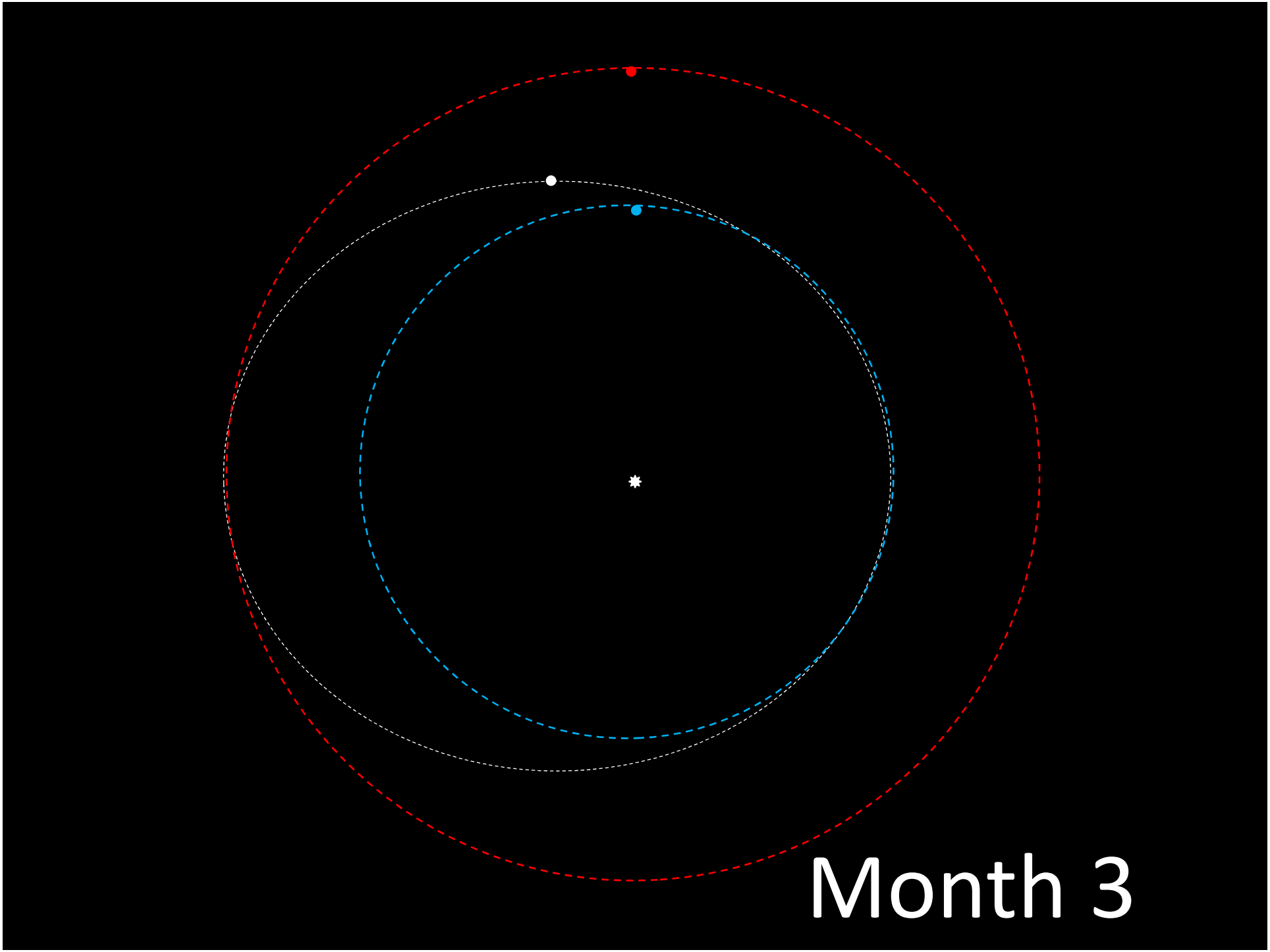
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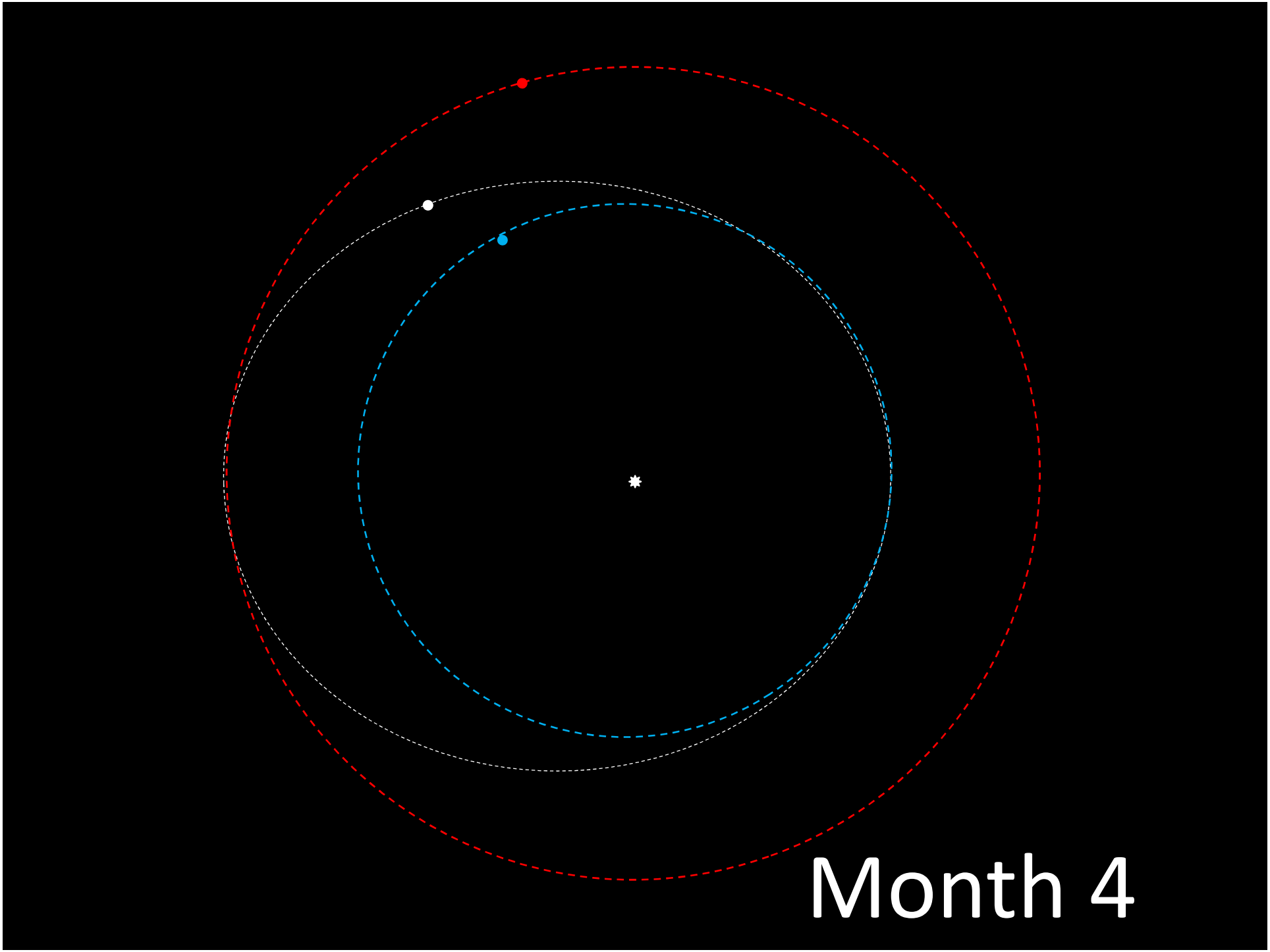
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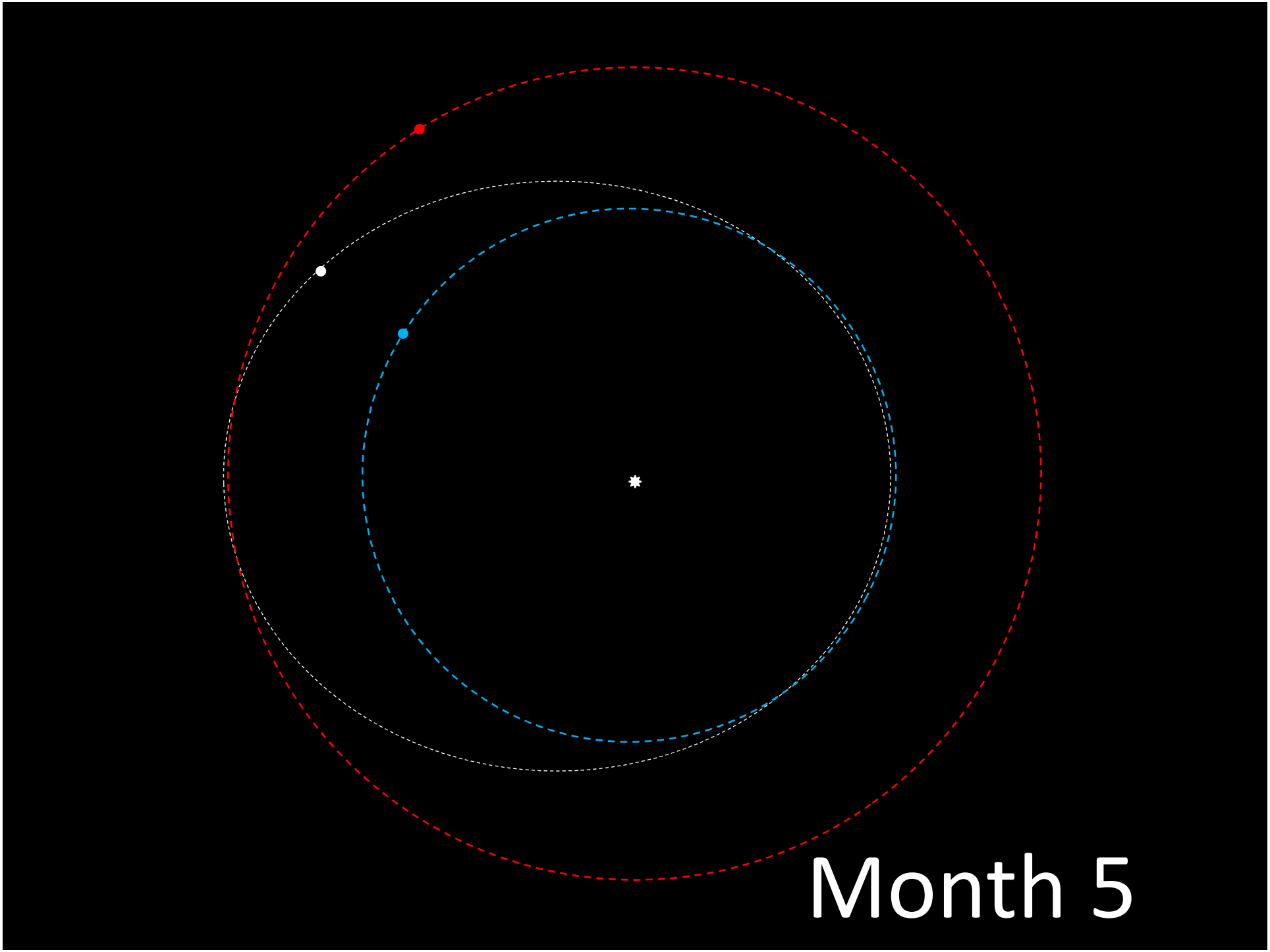
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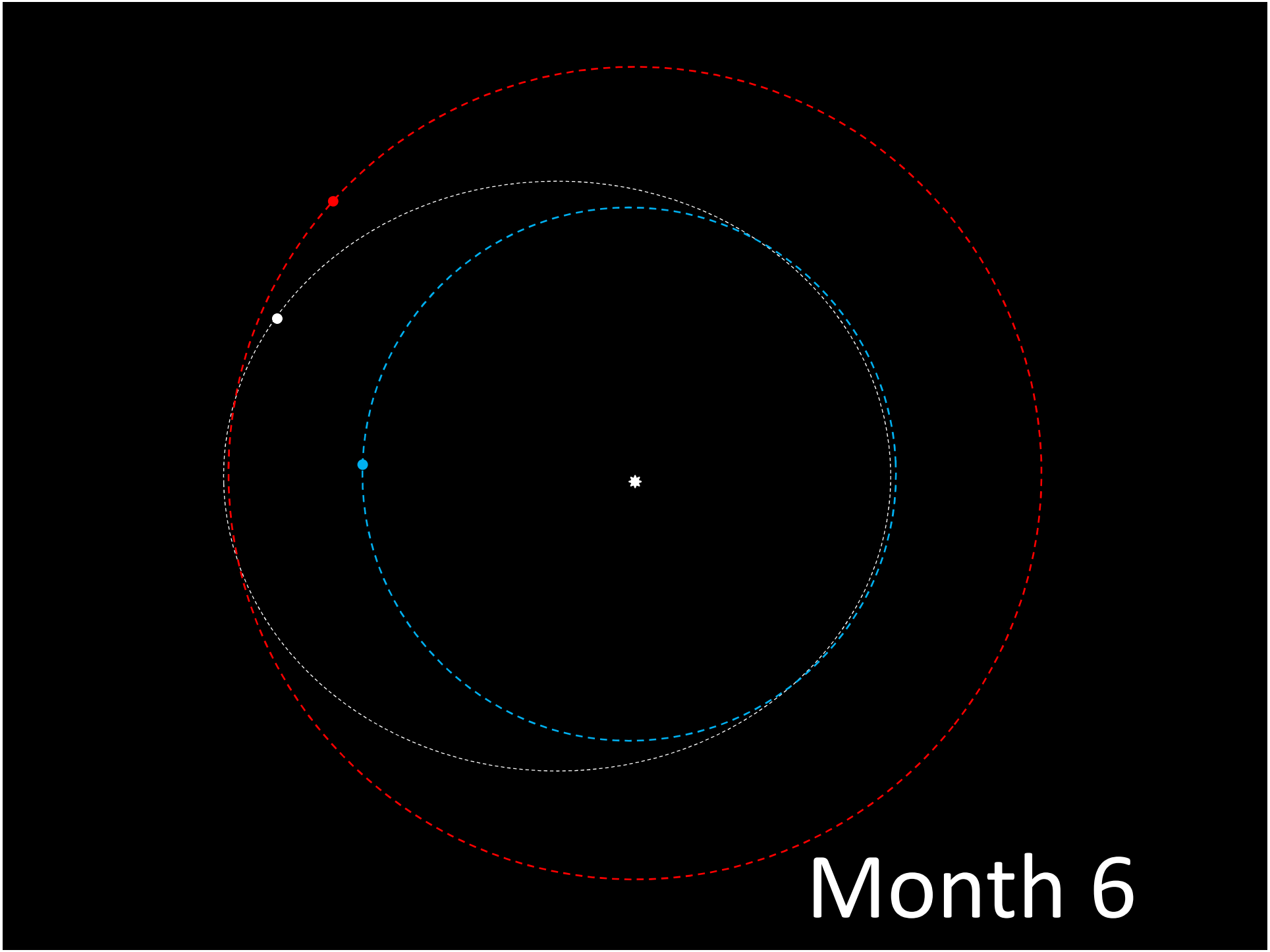
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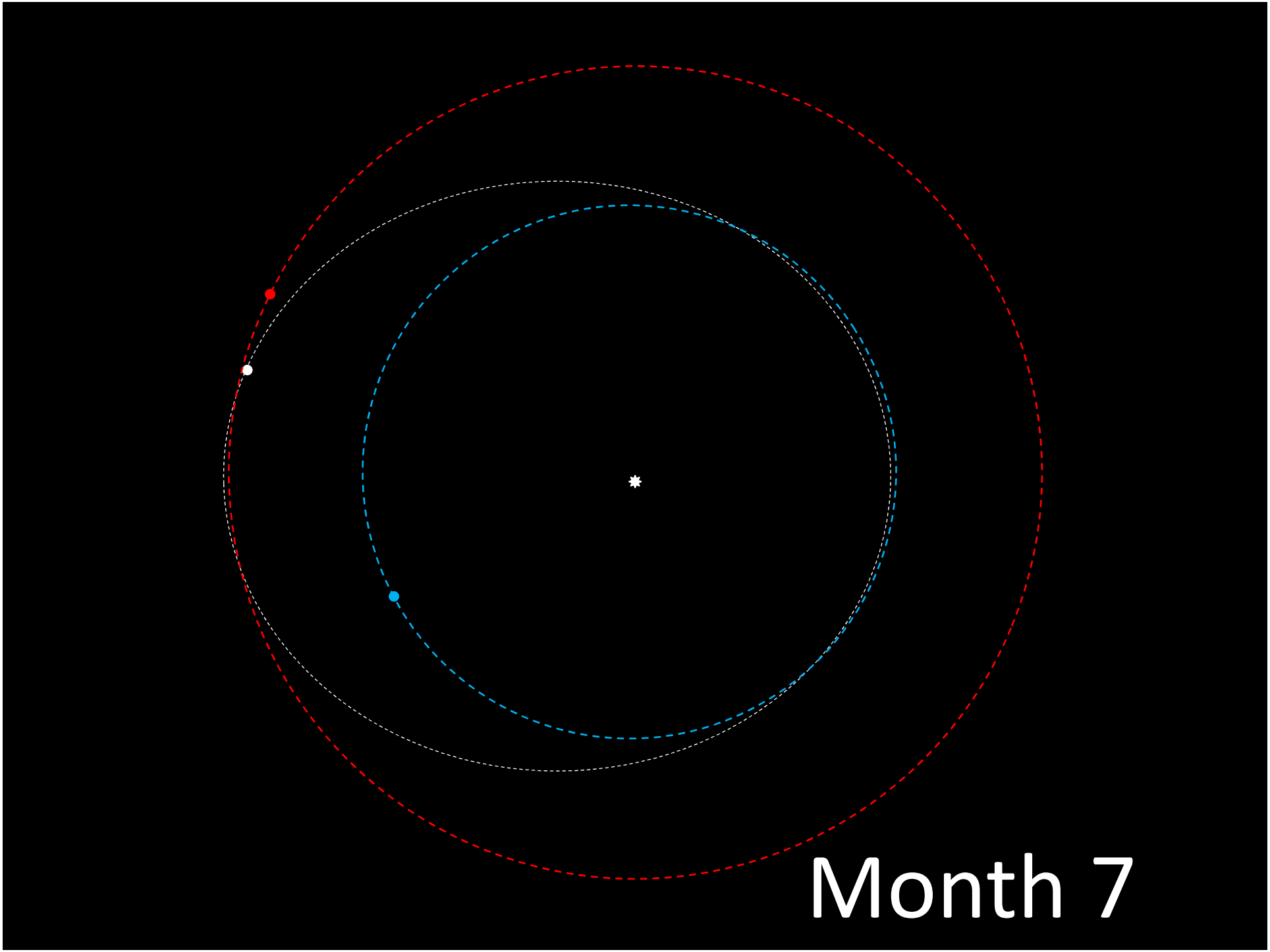
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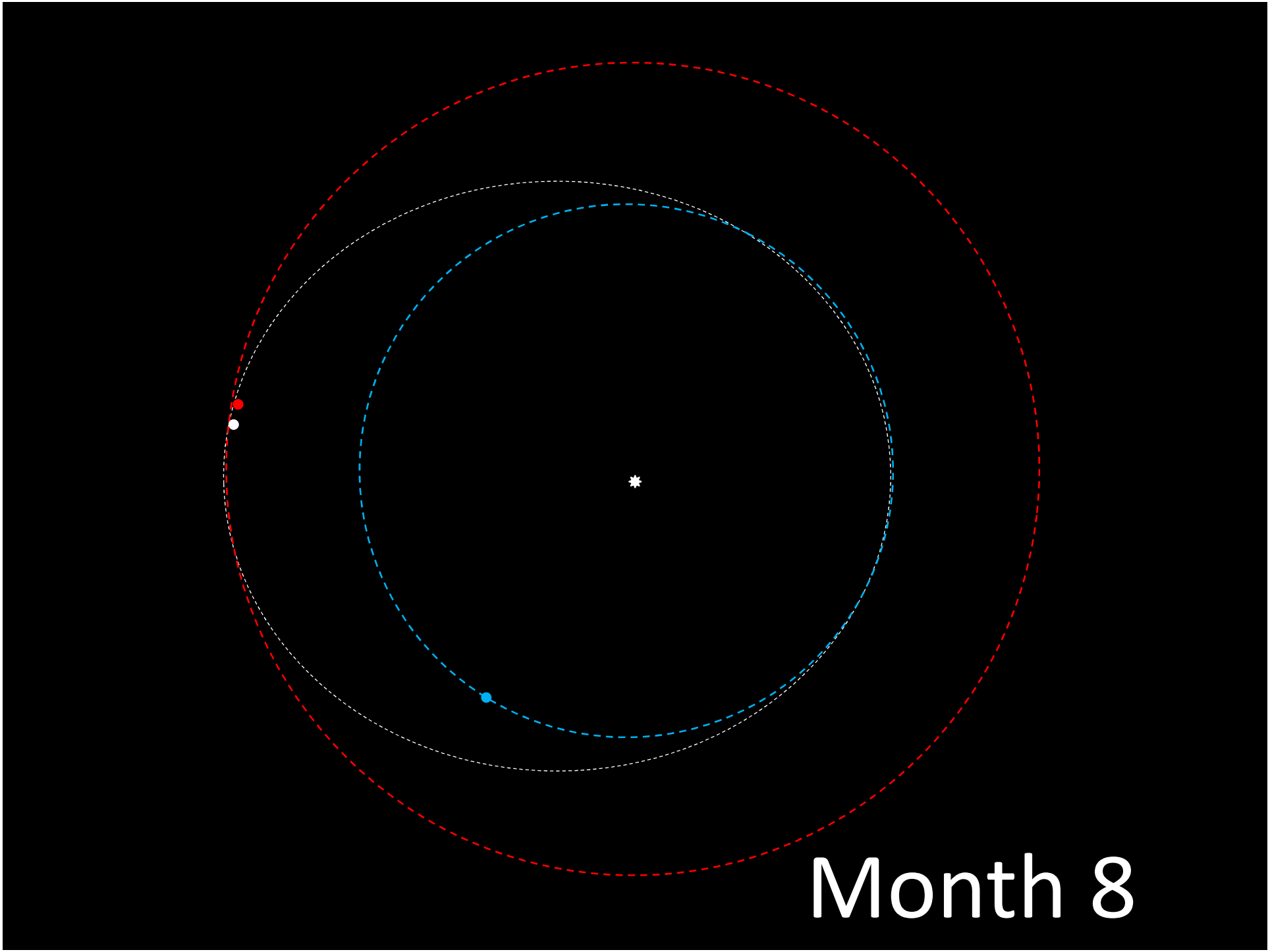
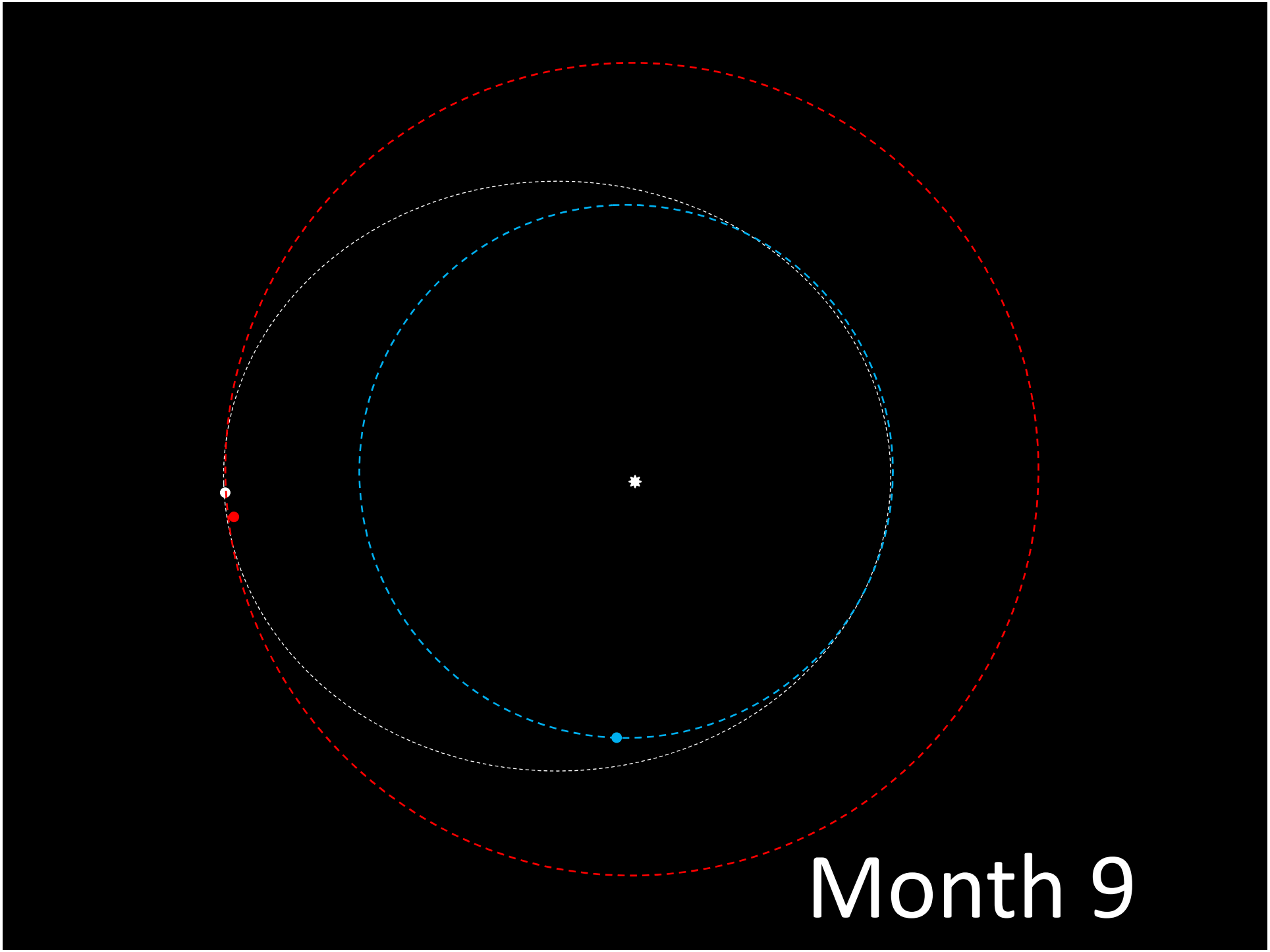

Month 8

Now we're heroes!
Month 8.5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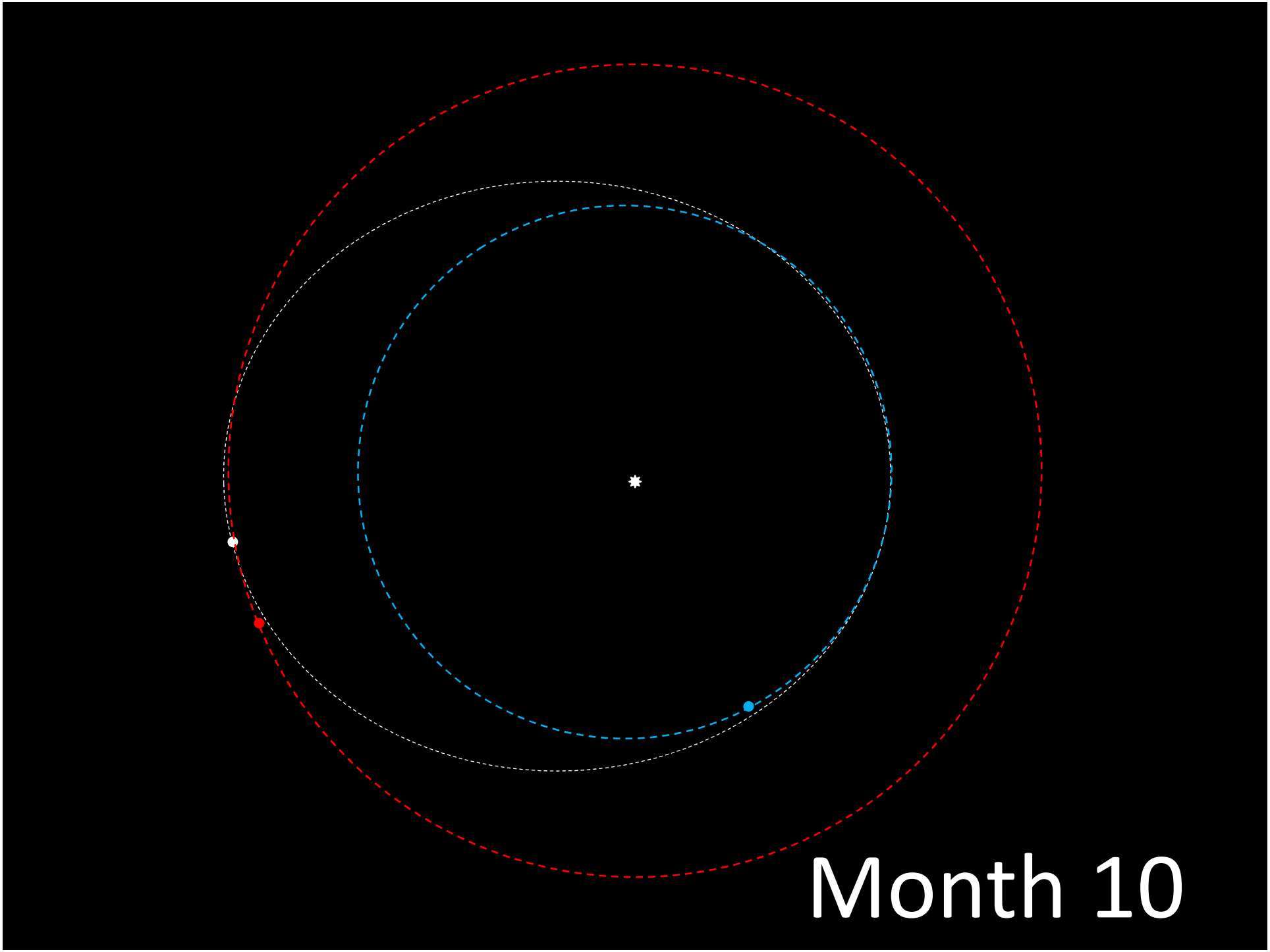
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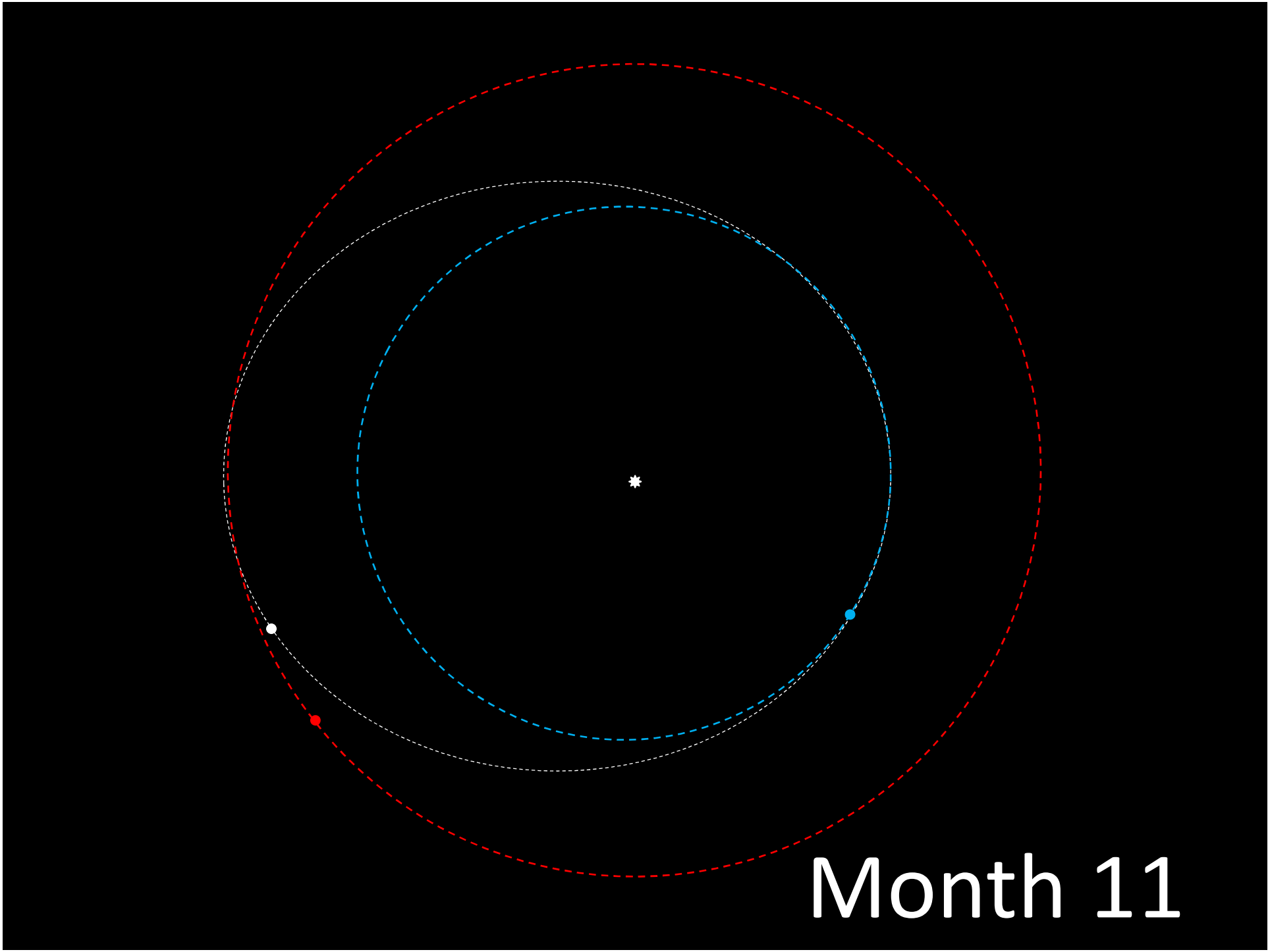
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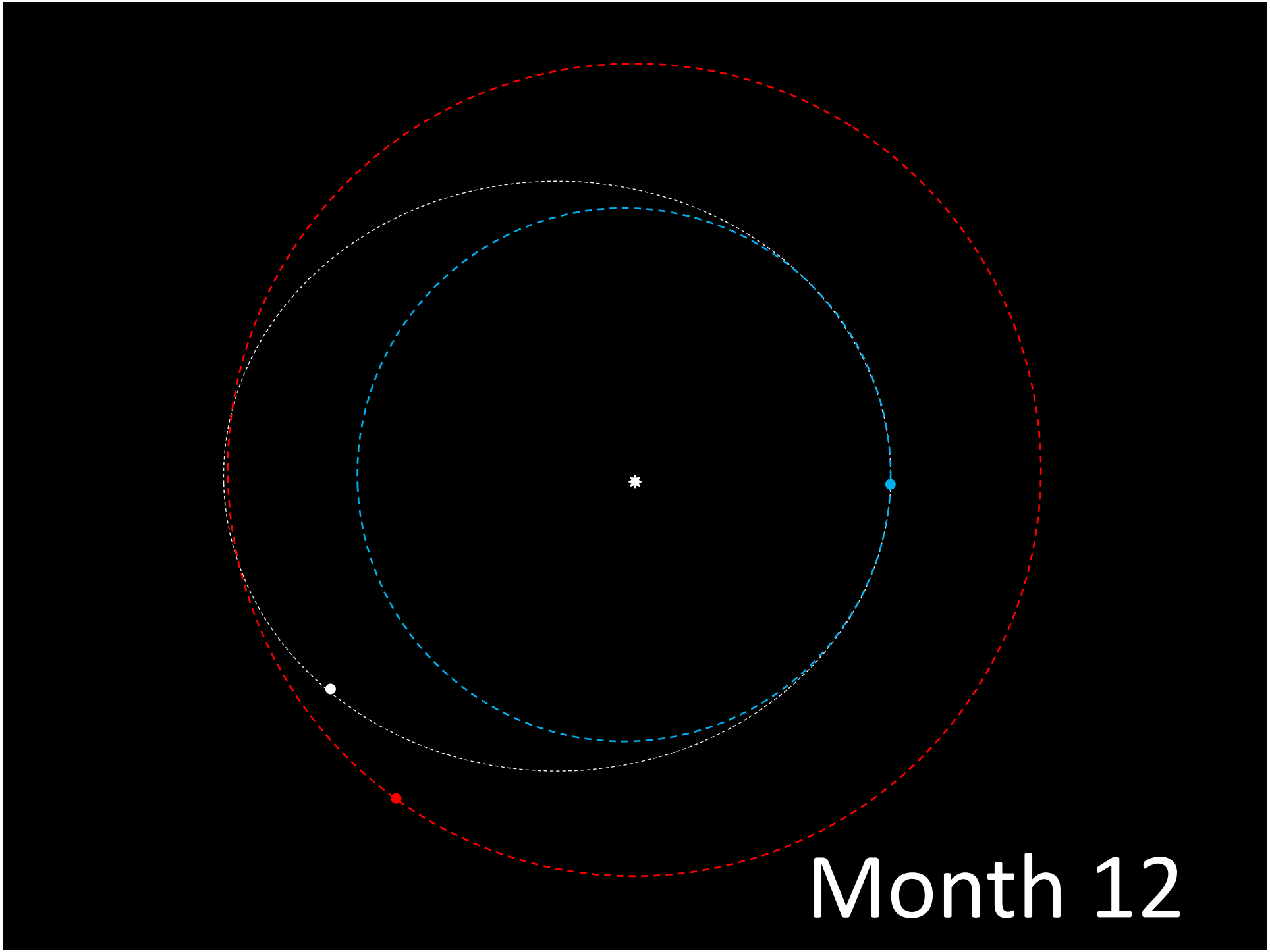
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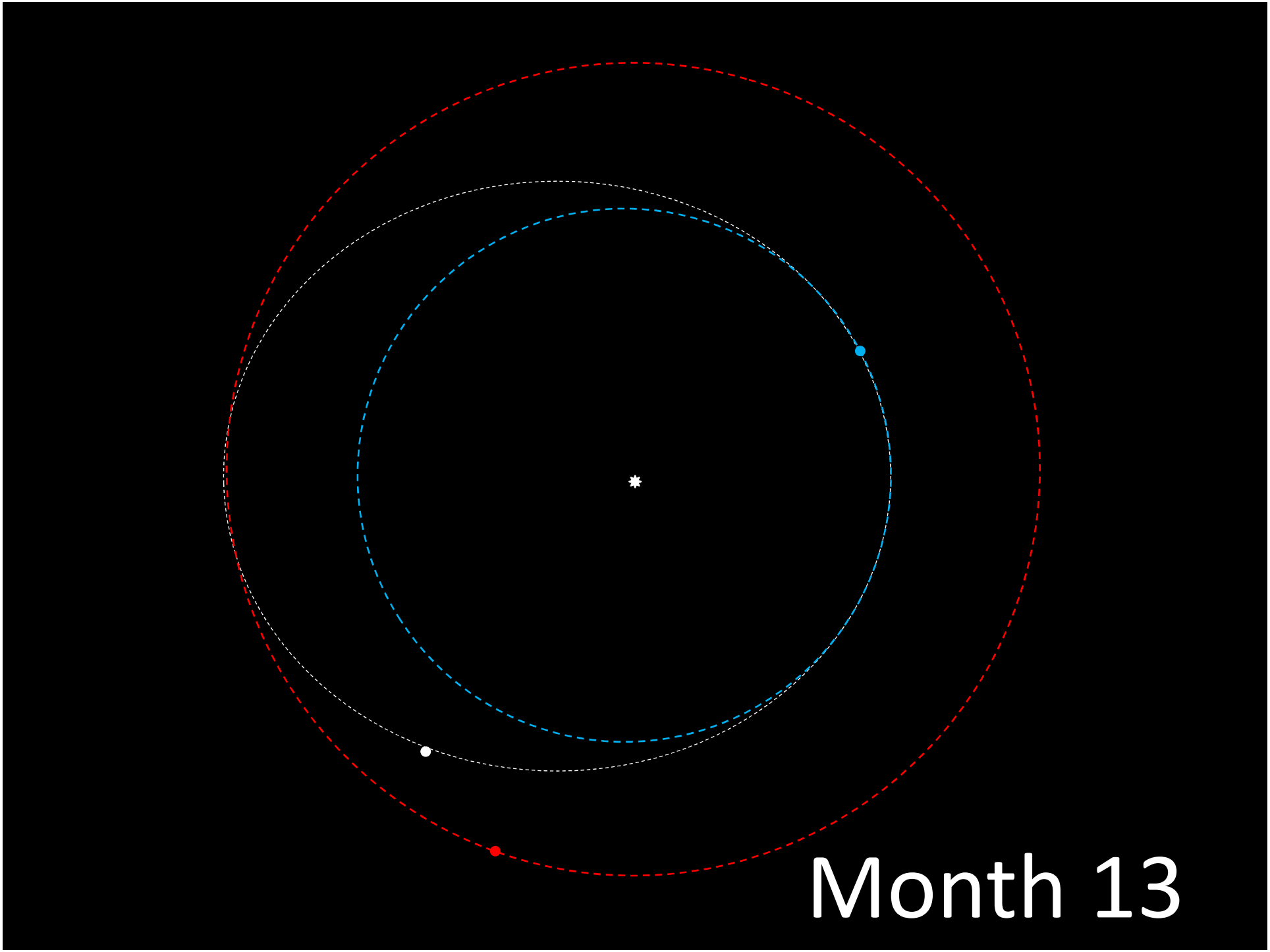
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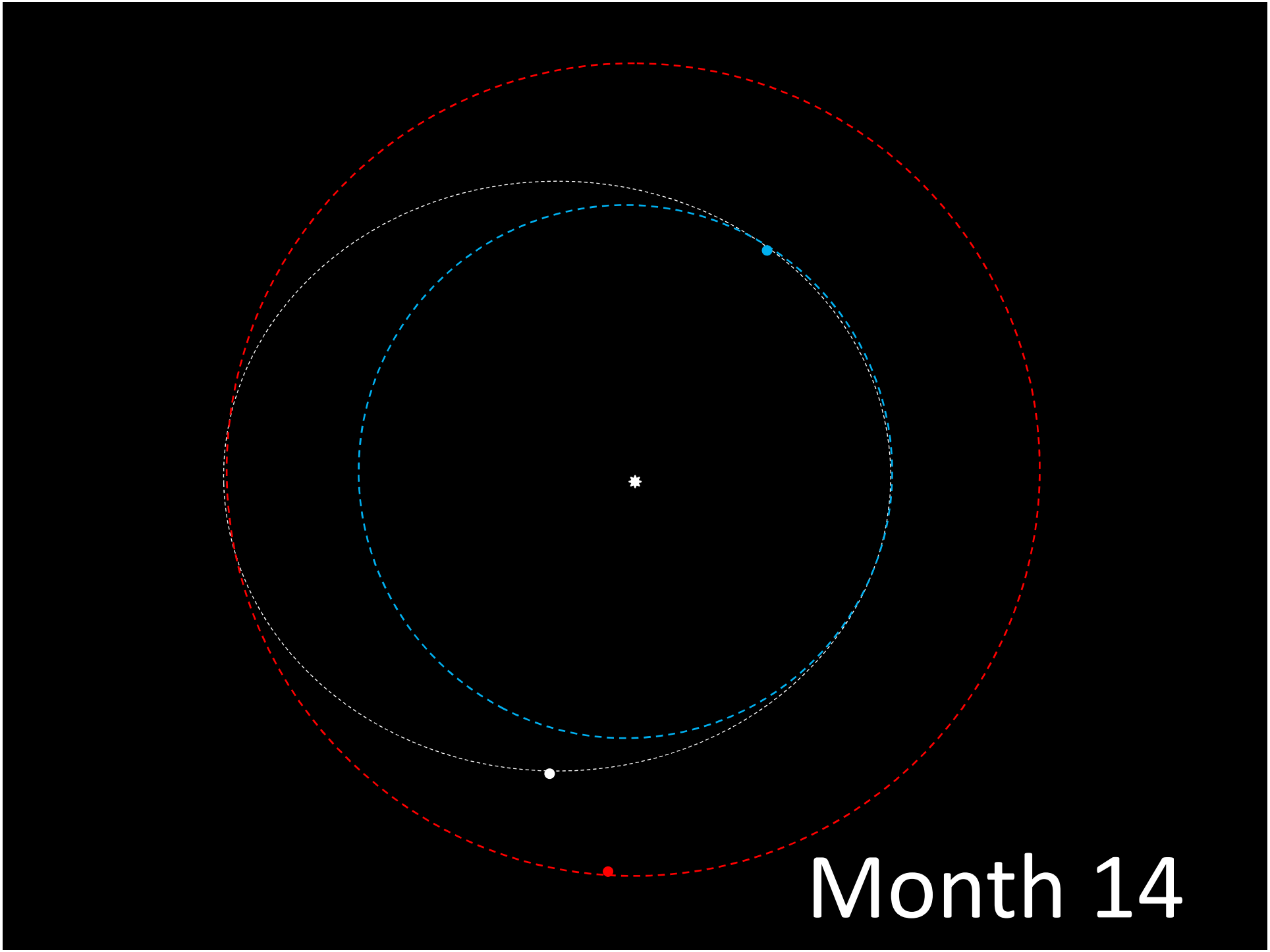
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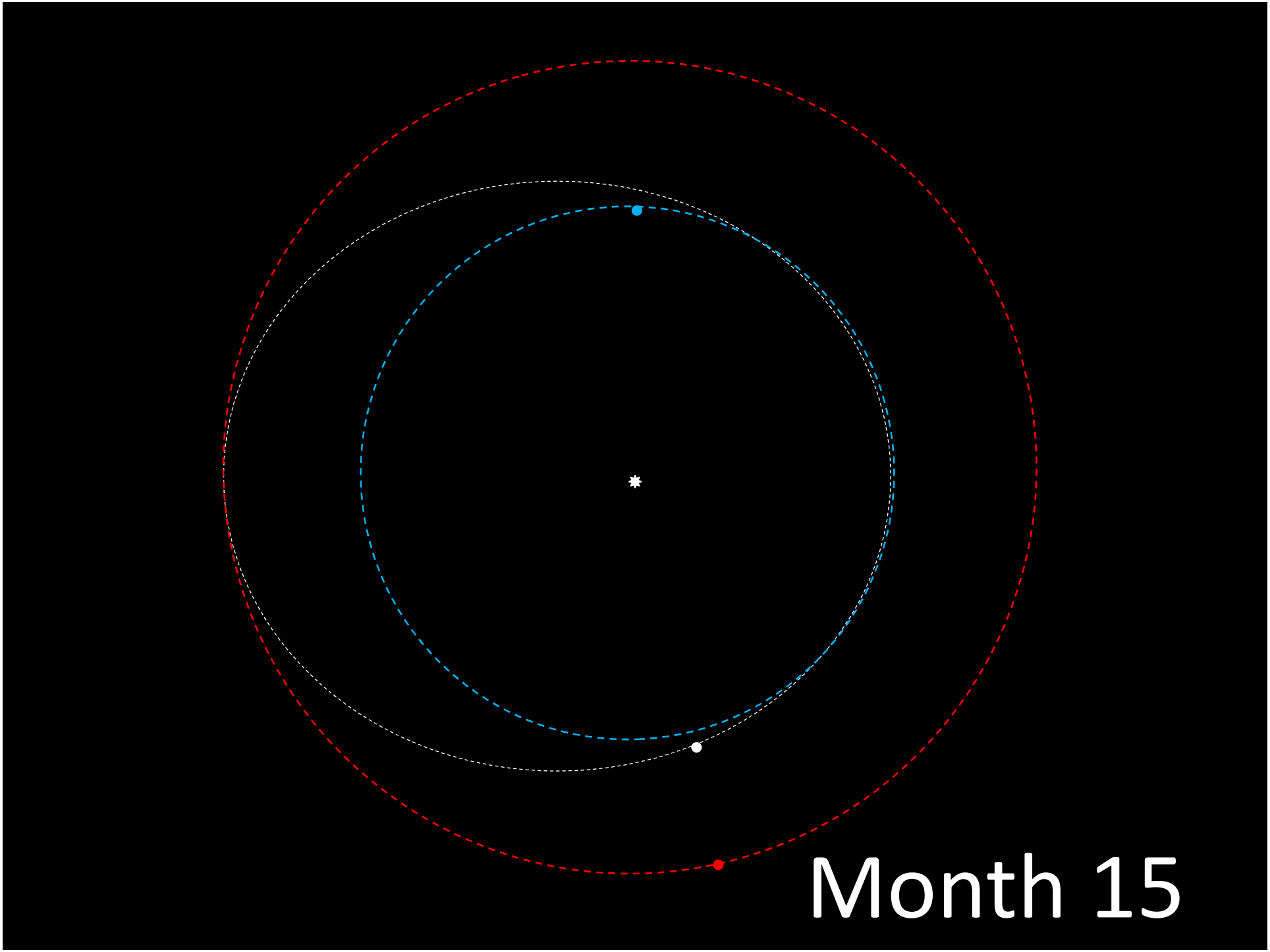
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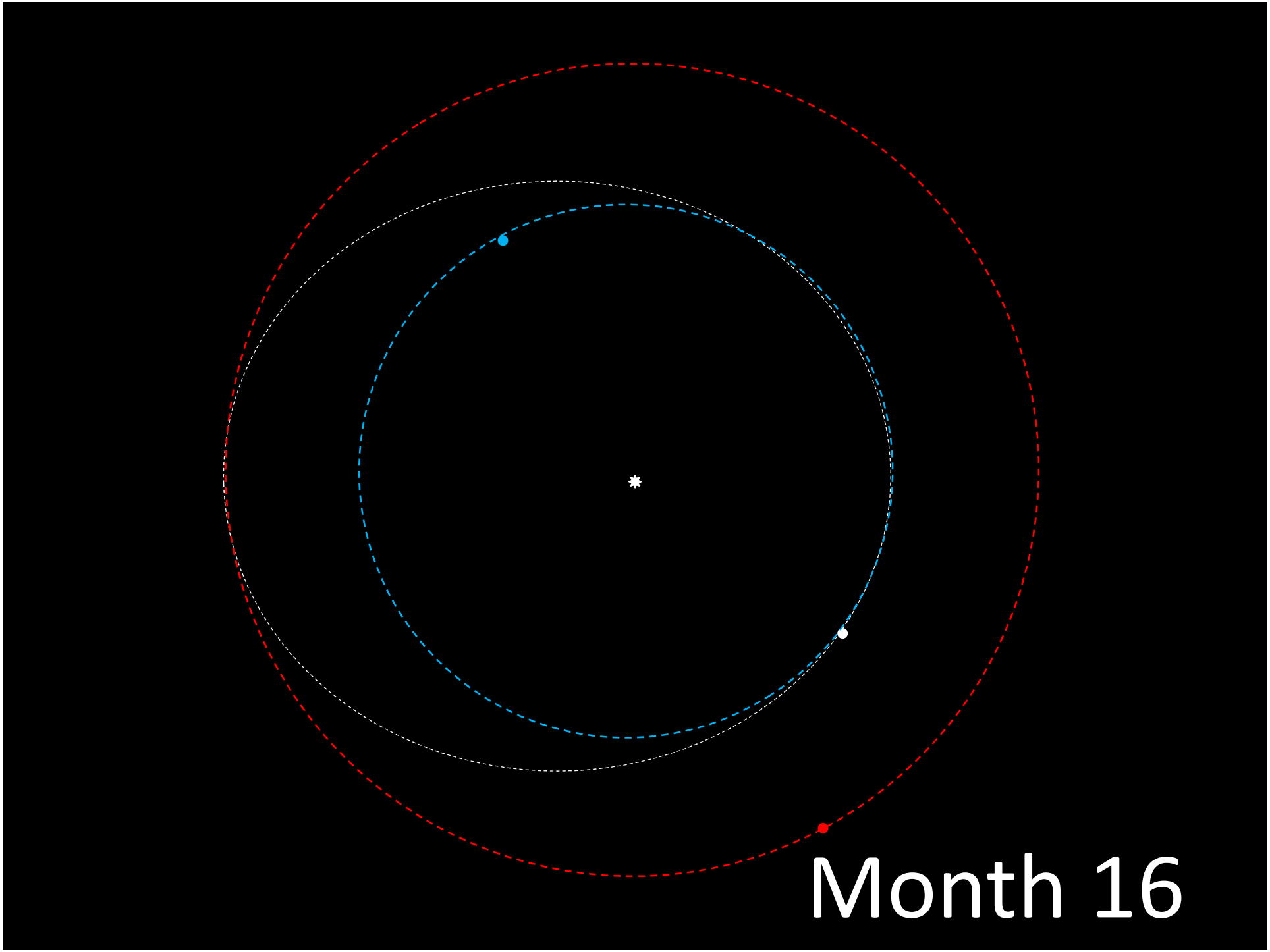
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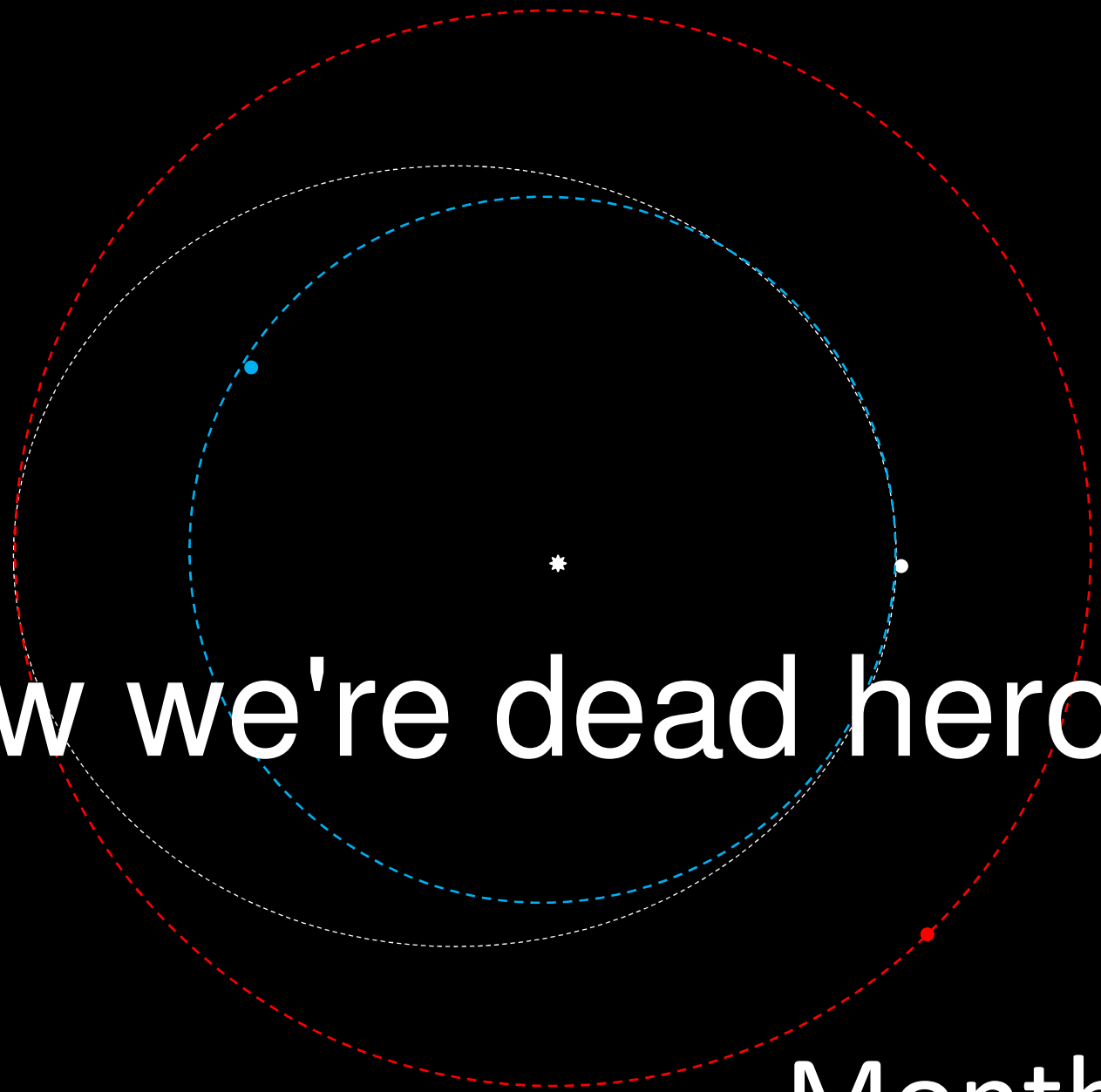
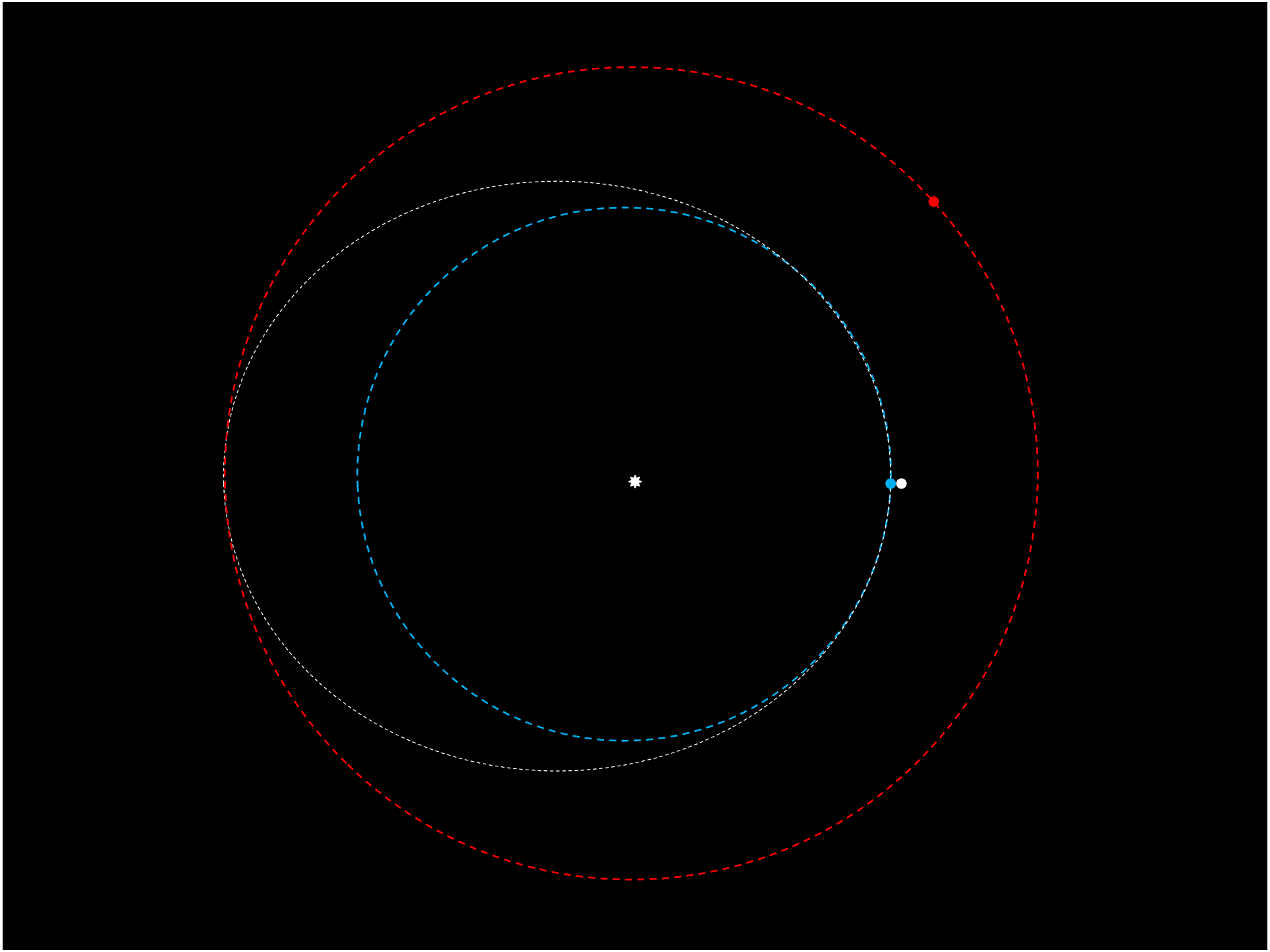
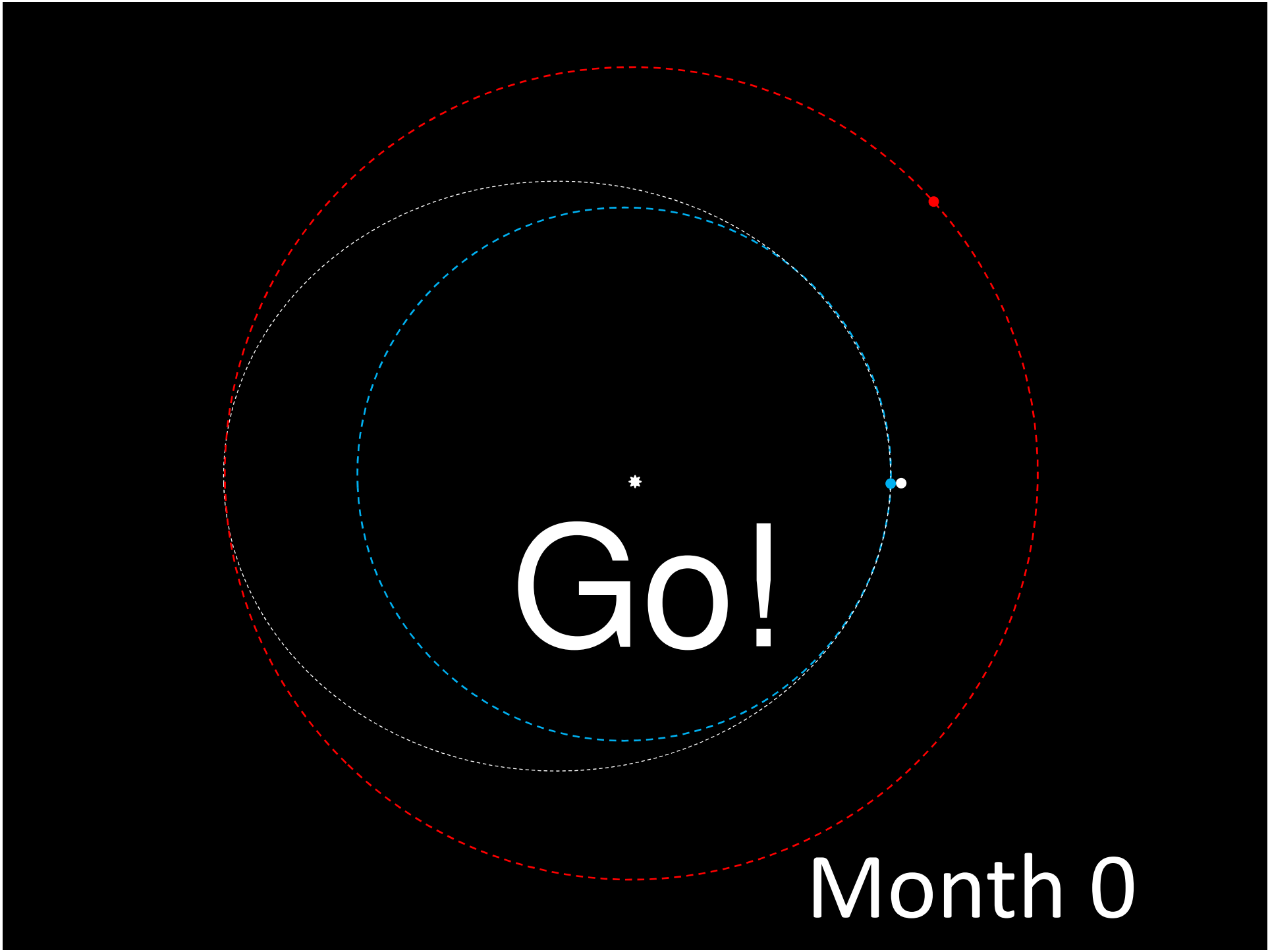
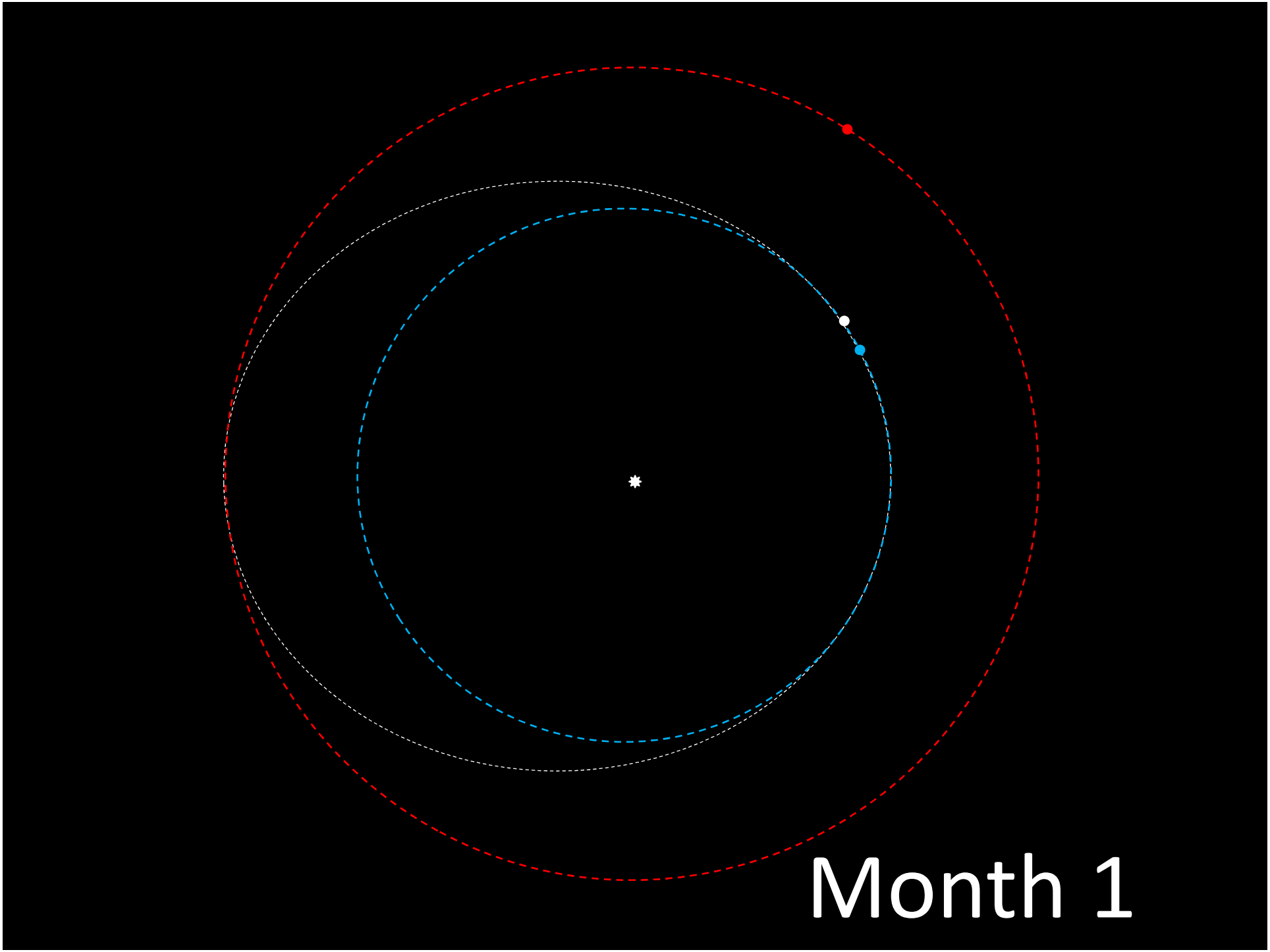


Now we're dead heroes.

Month 17




Go!
Month 0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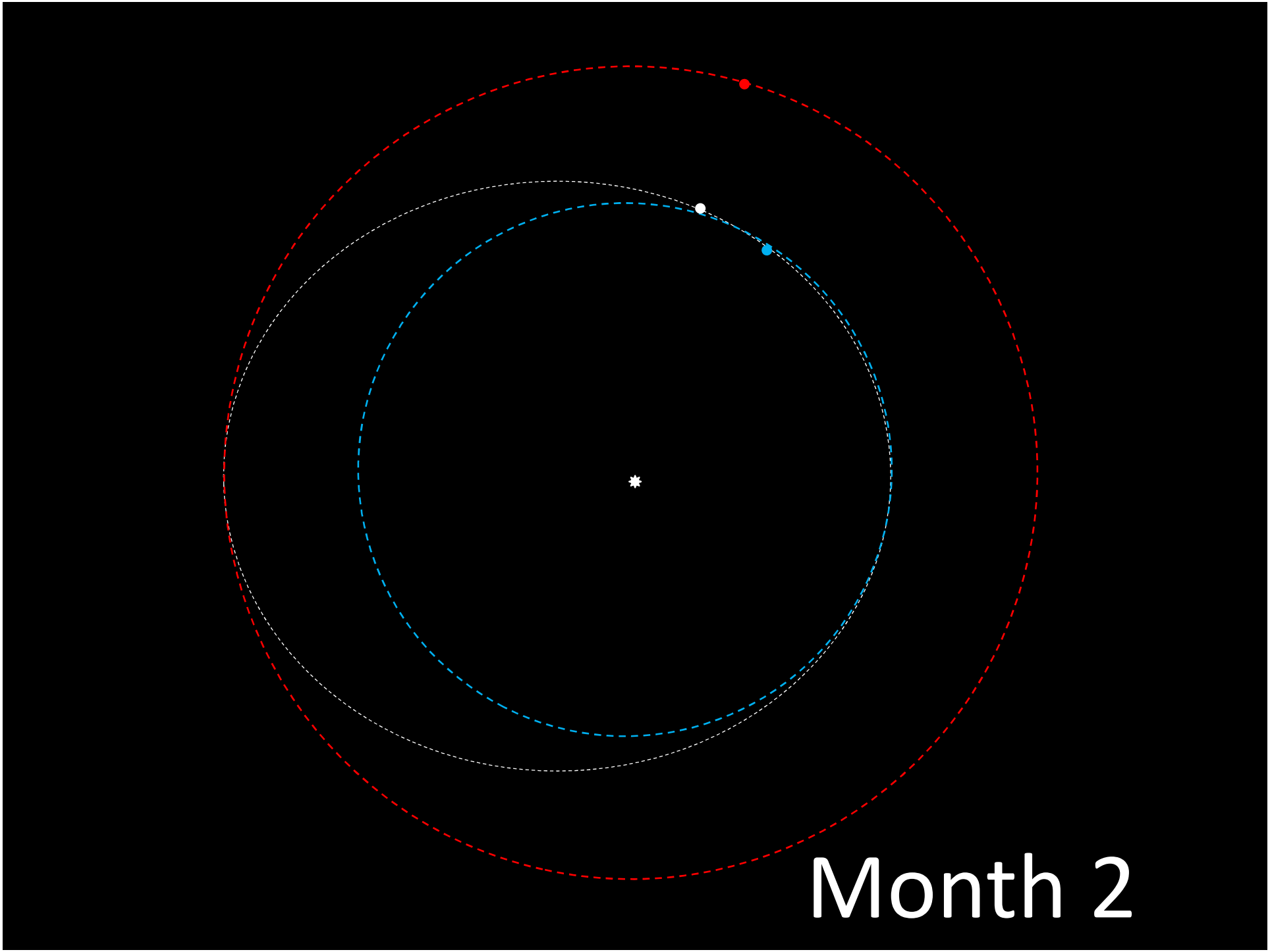
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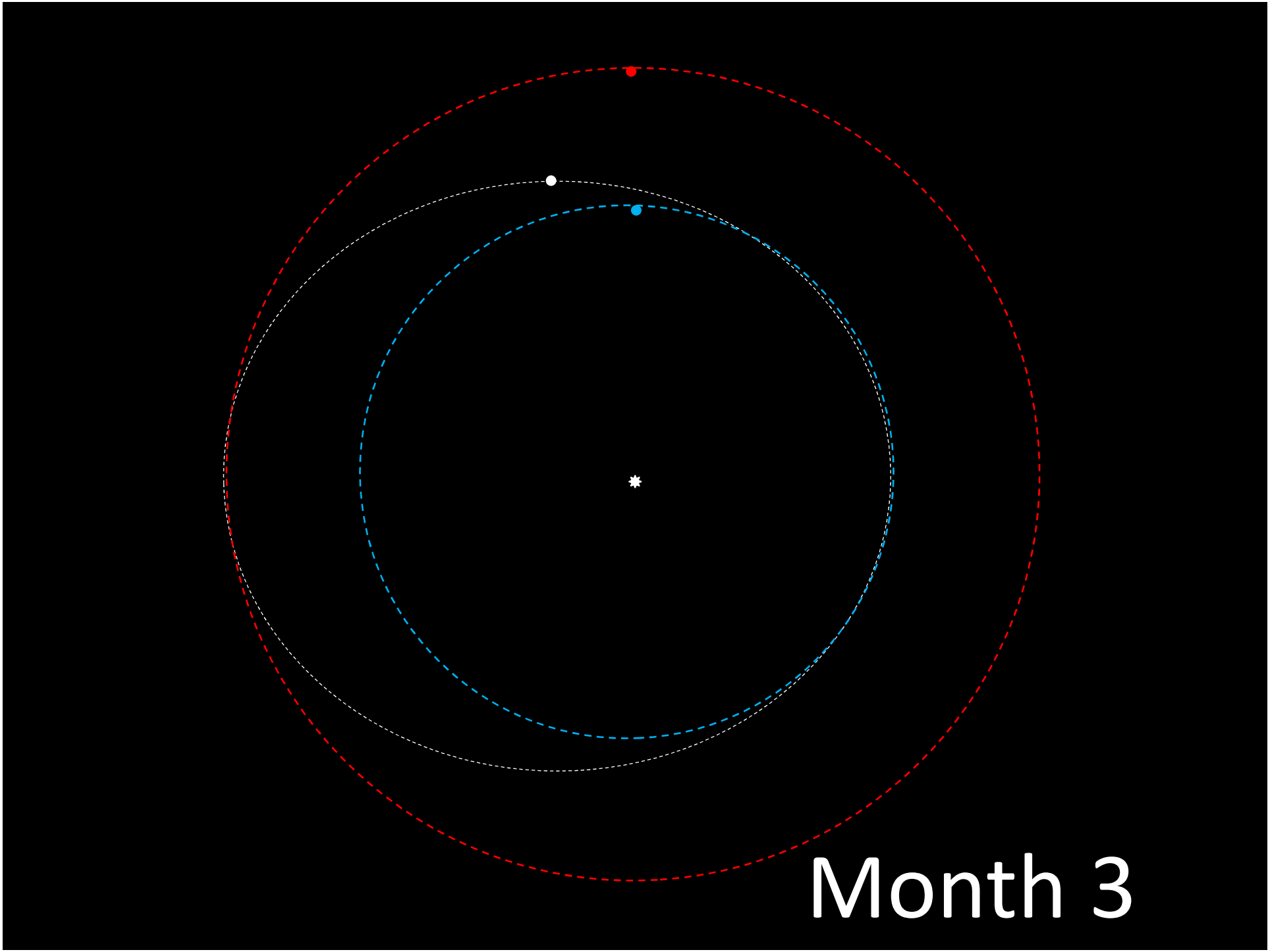
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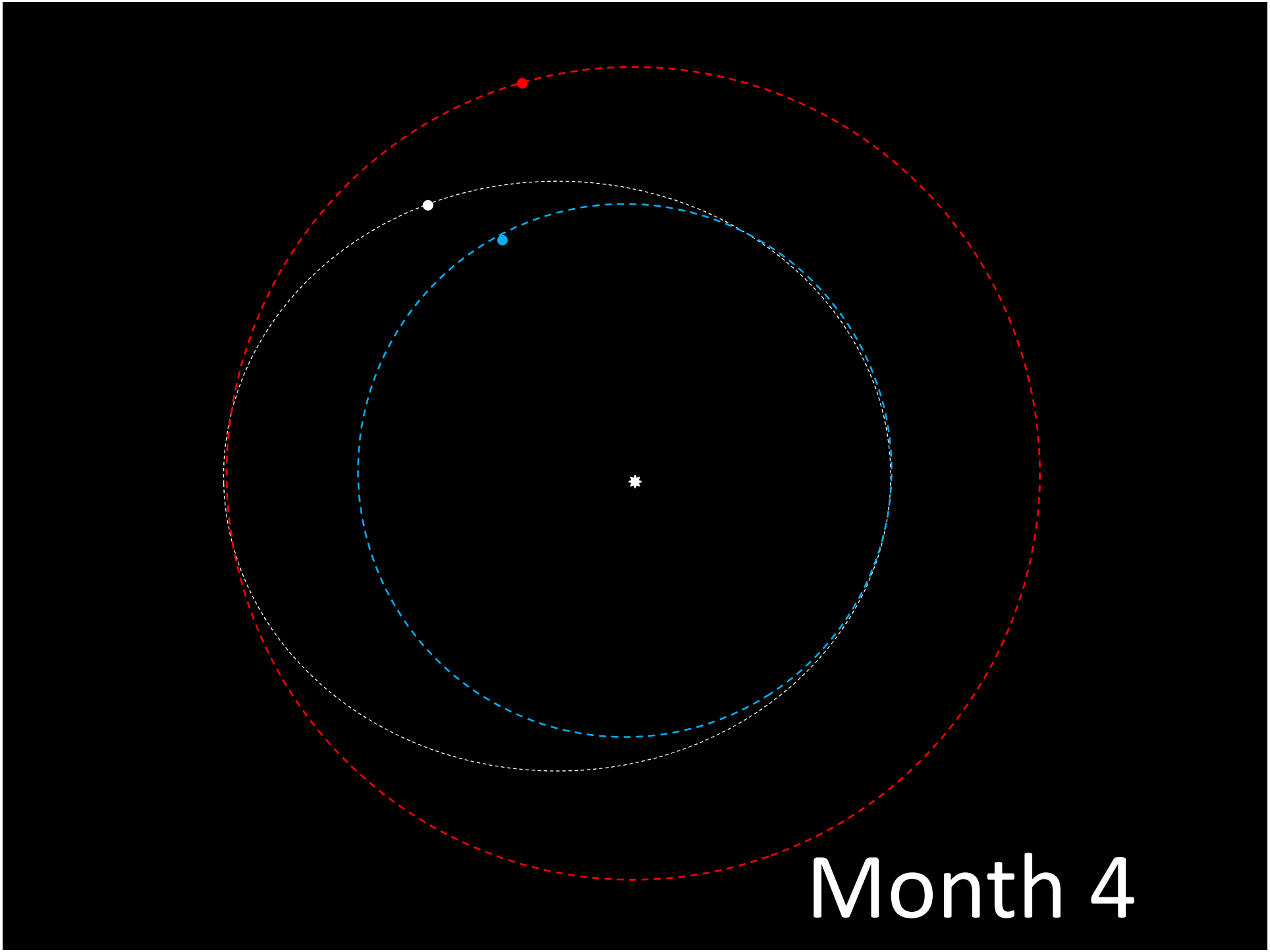
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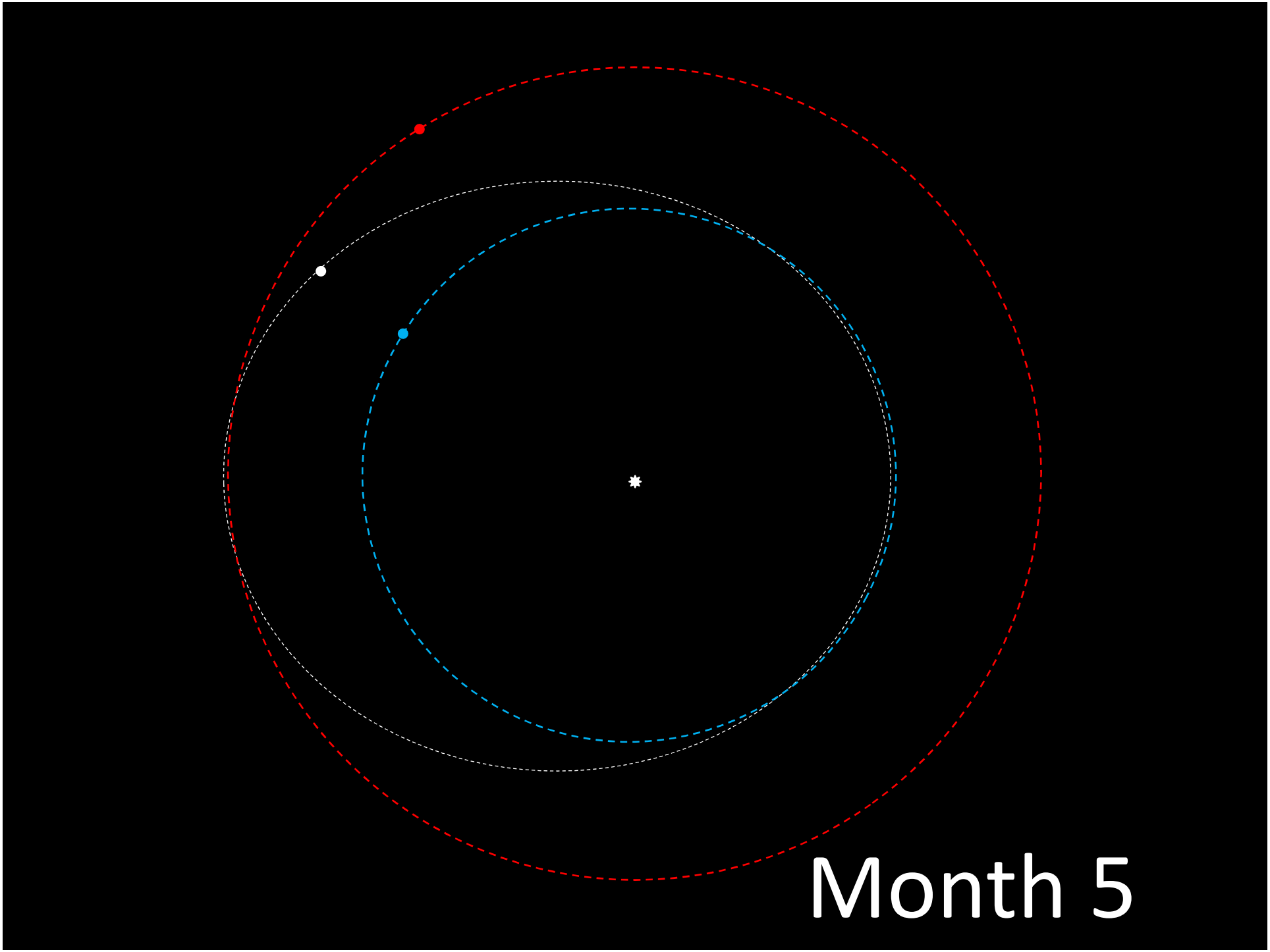
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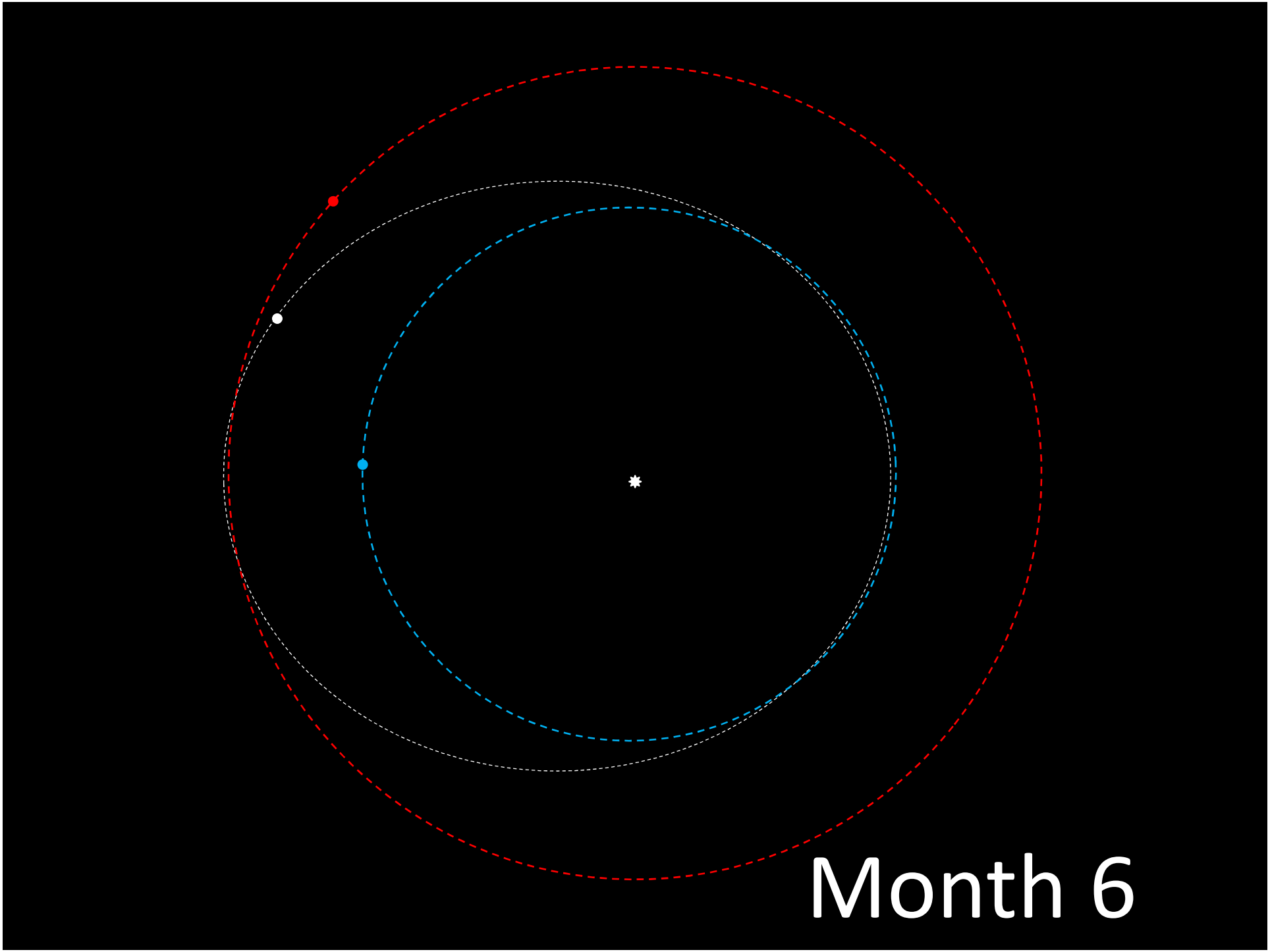
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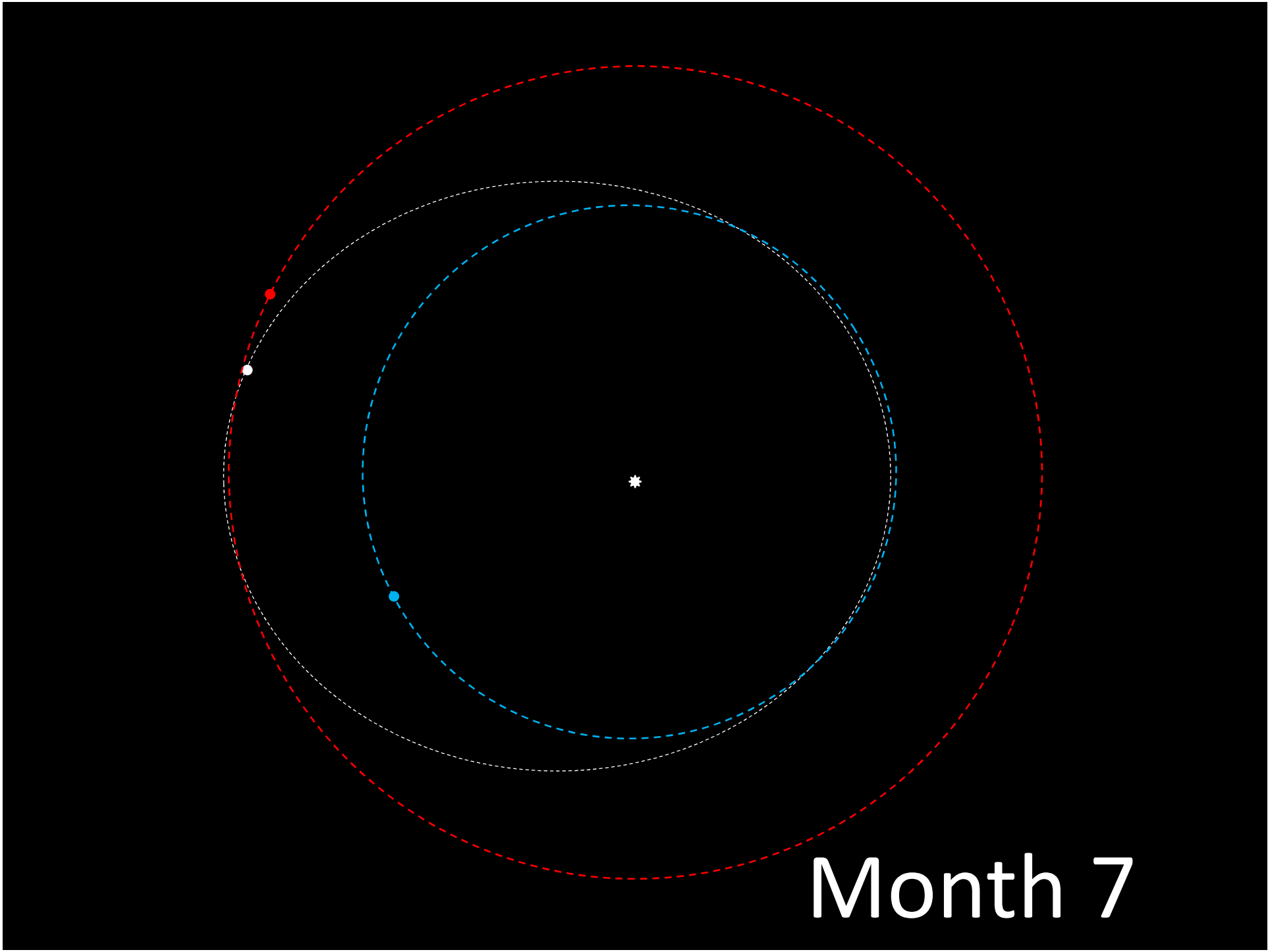
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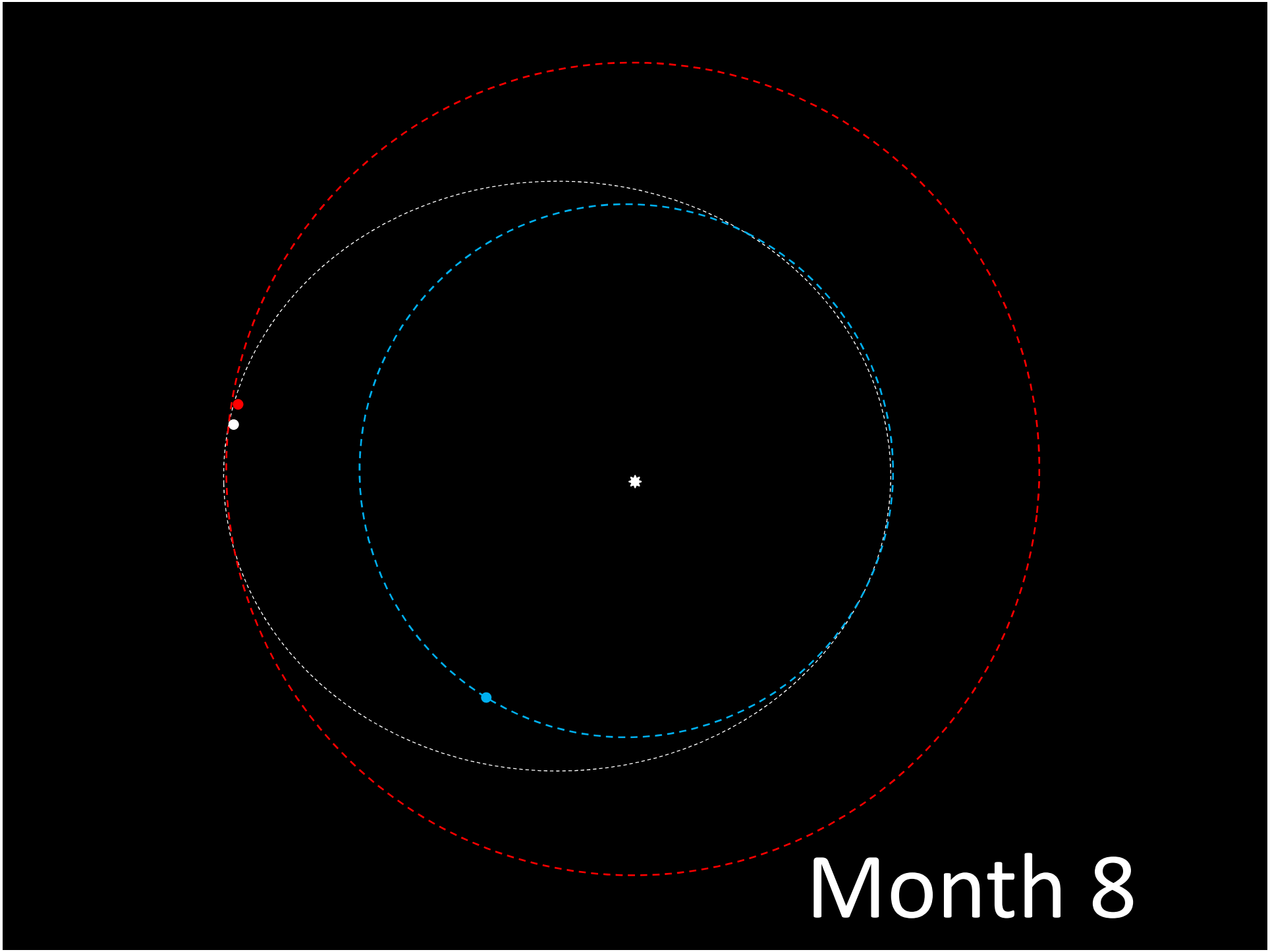
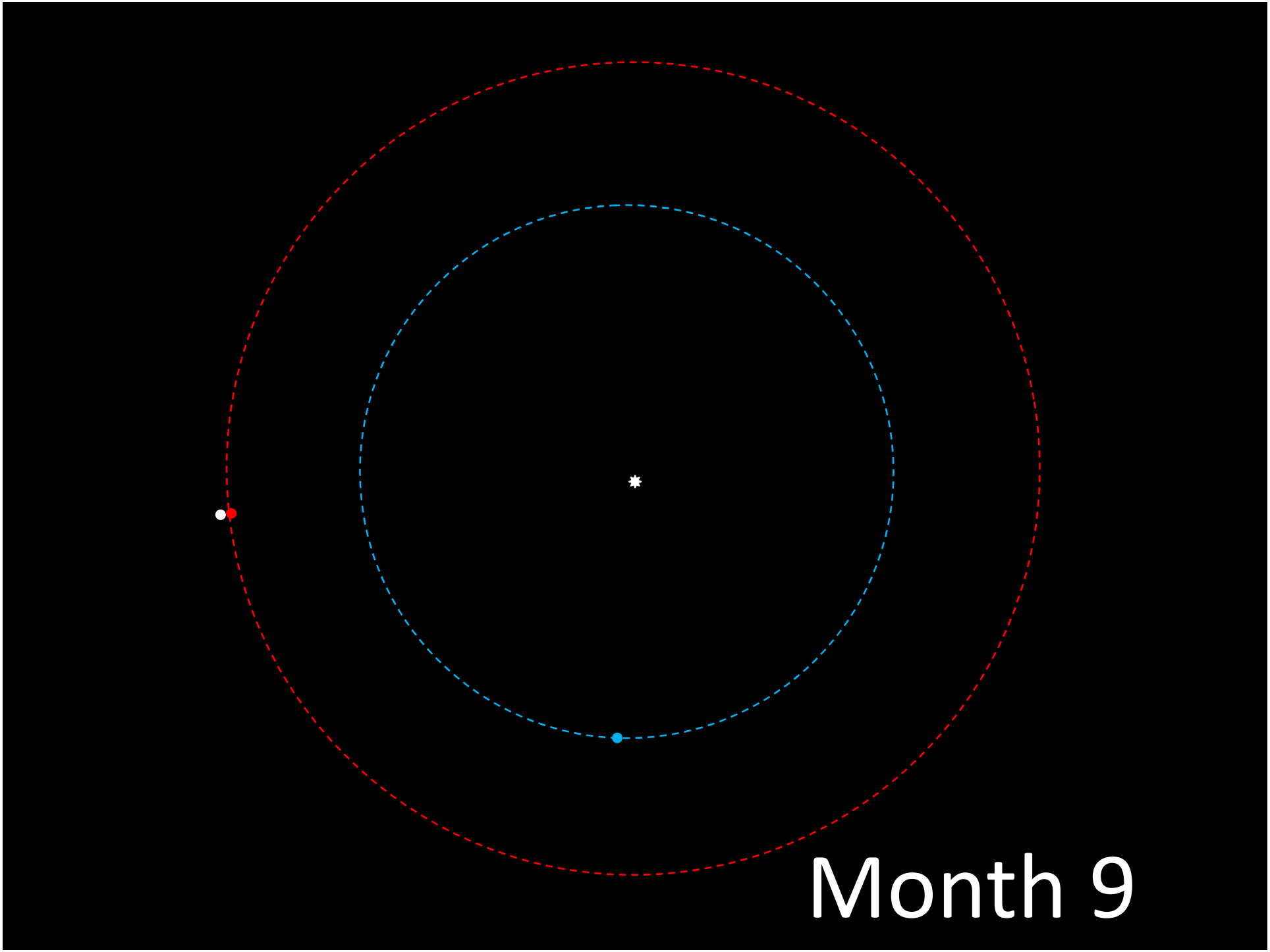

Month 8

We made it!

Month 8.5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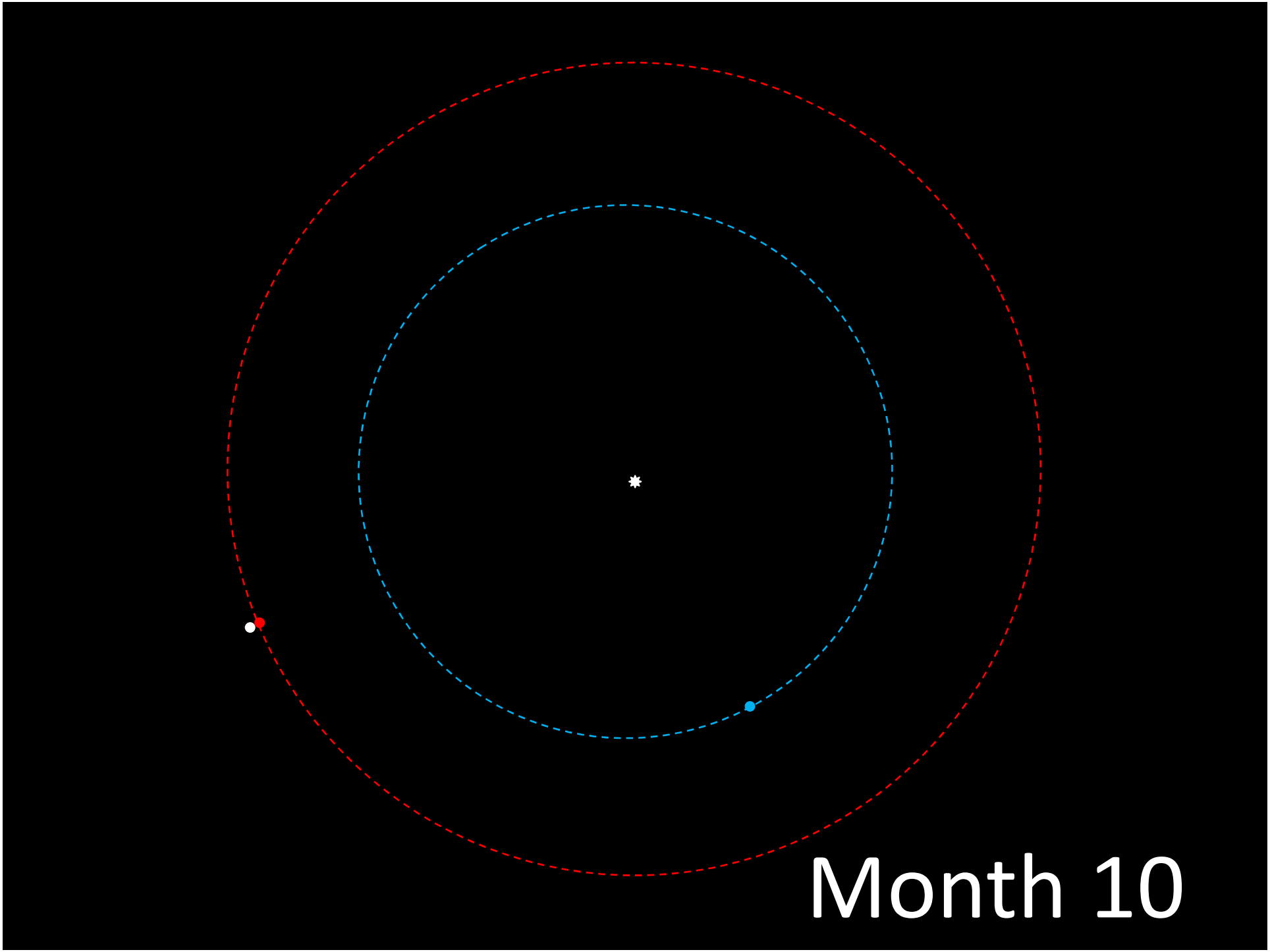
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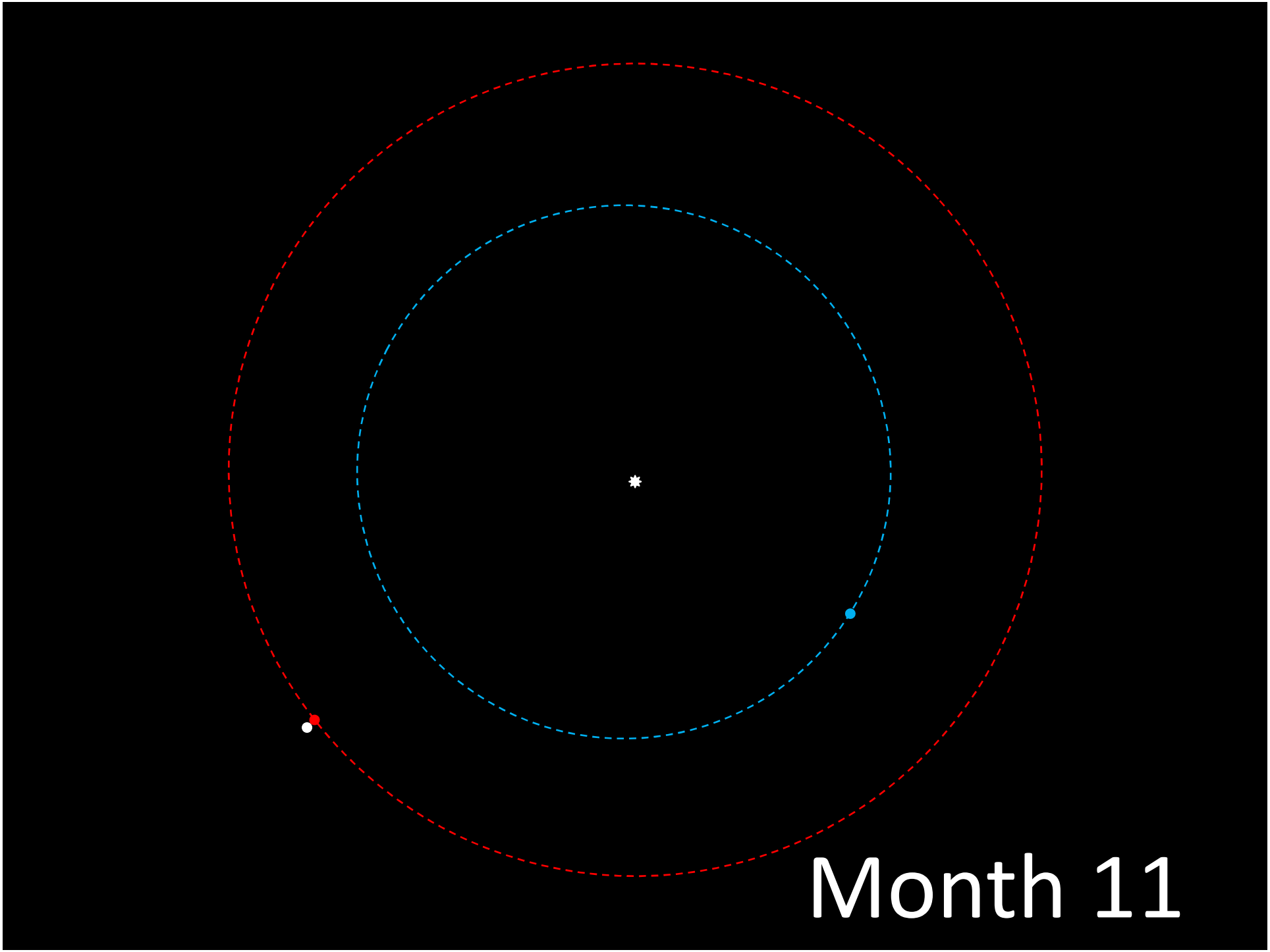
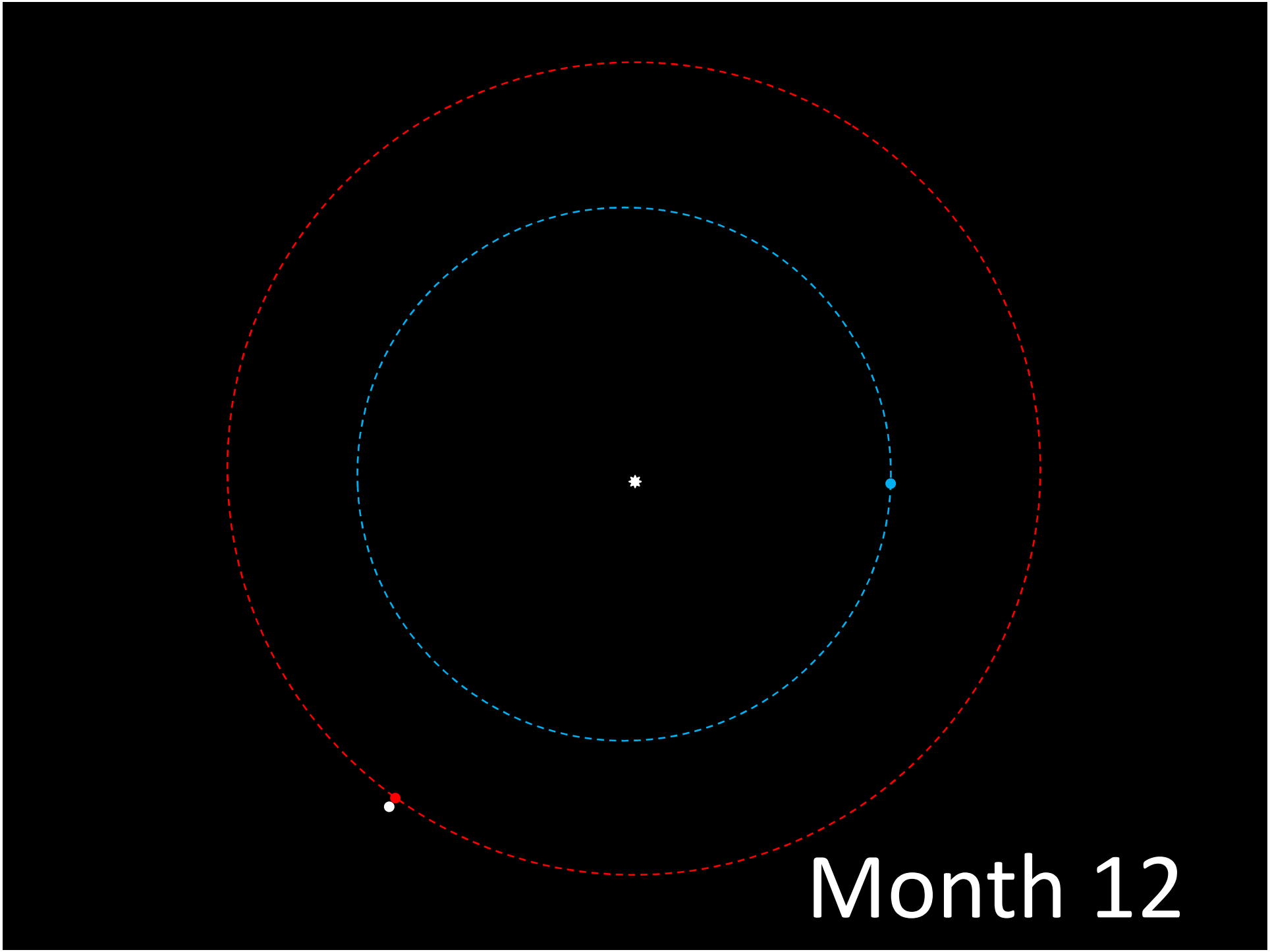
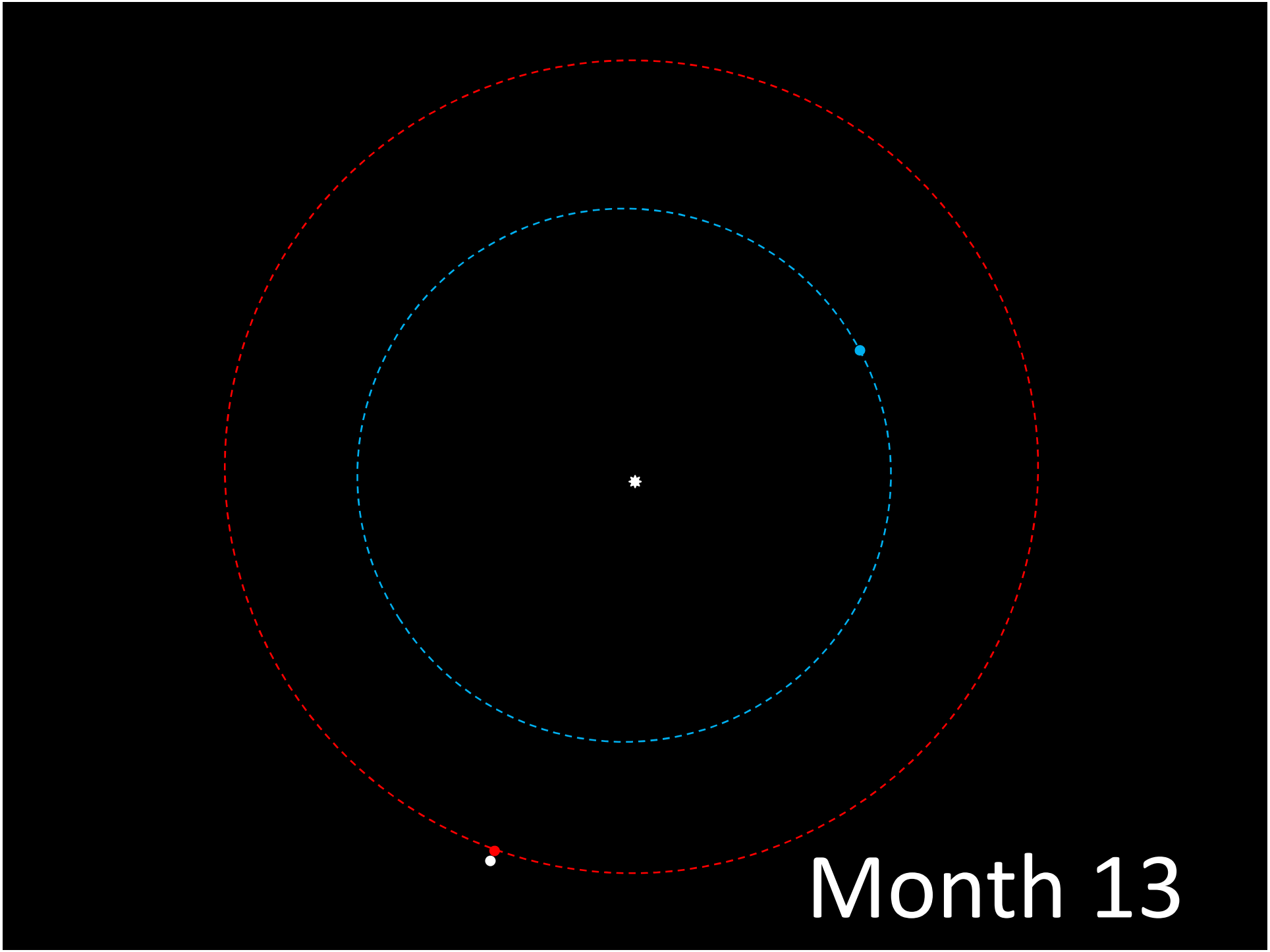

Month 11


Month 12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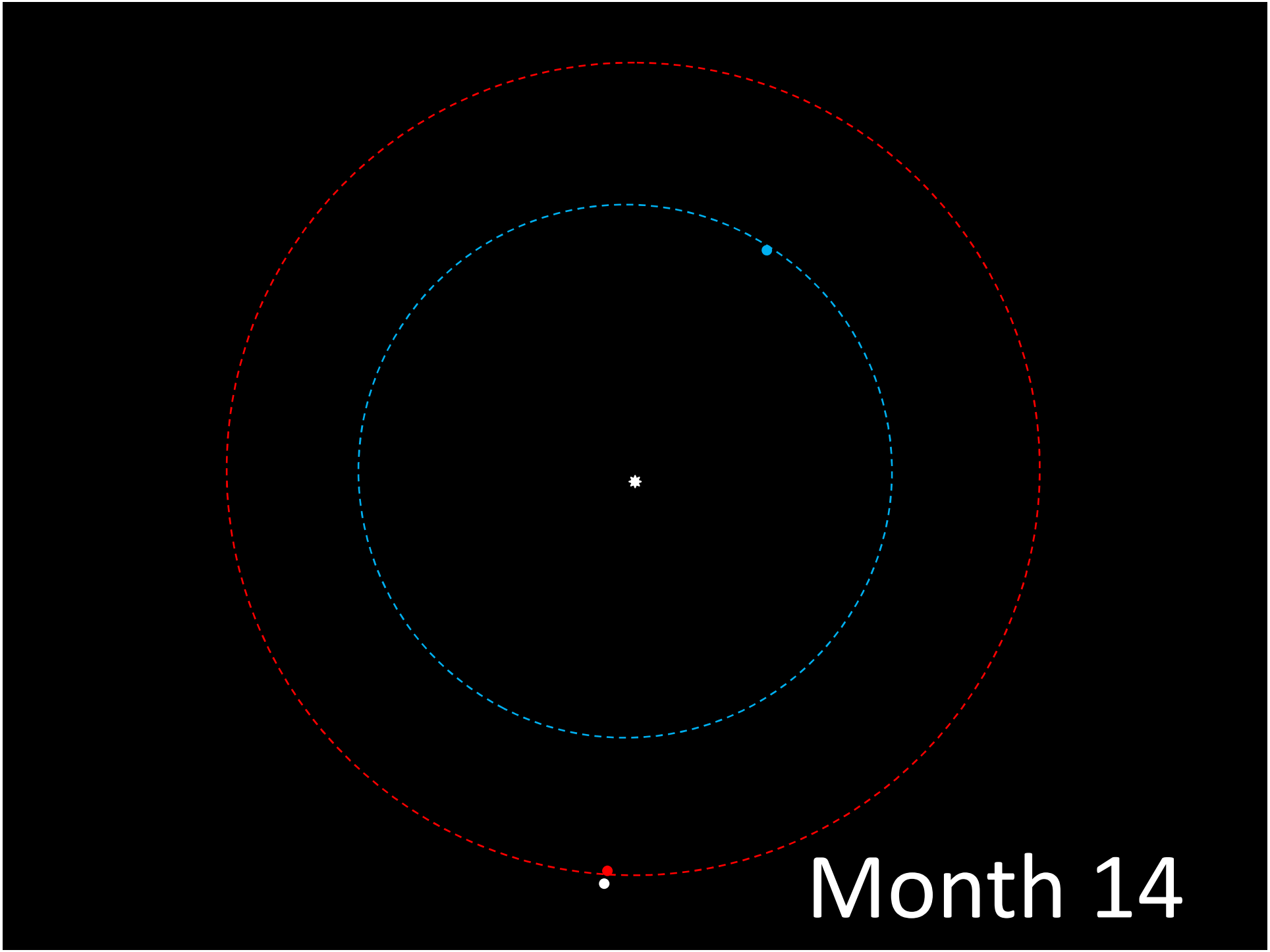
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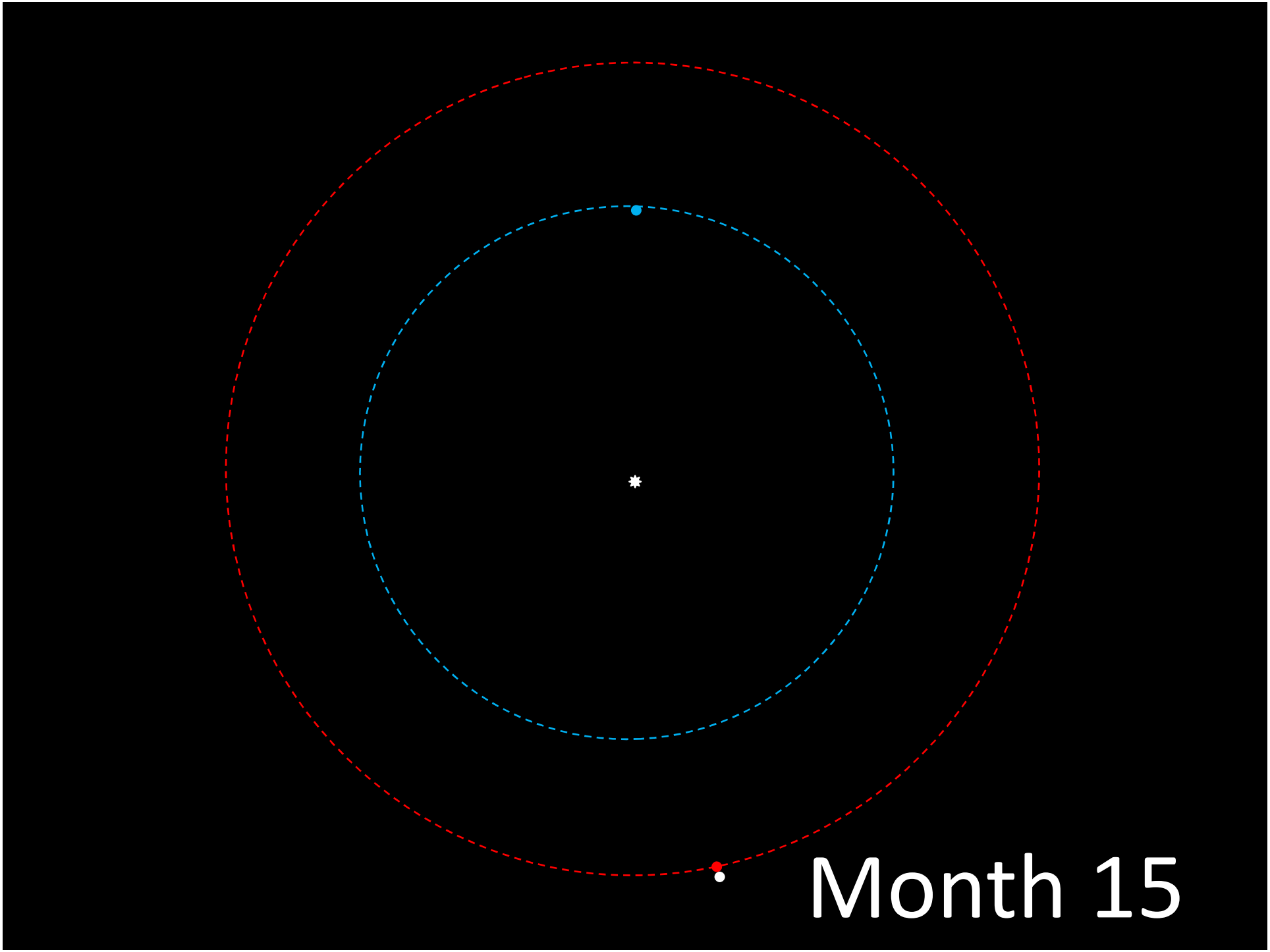
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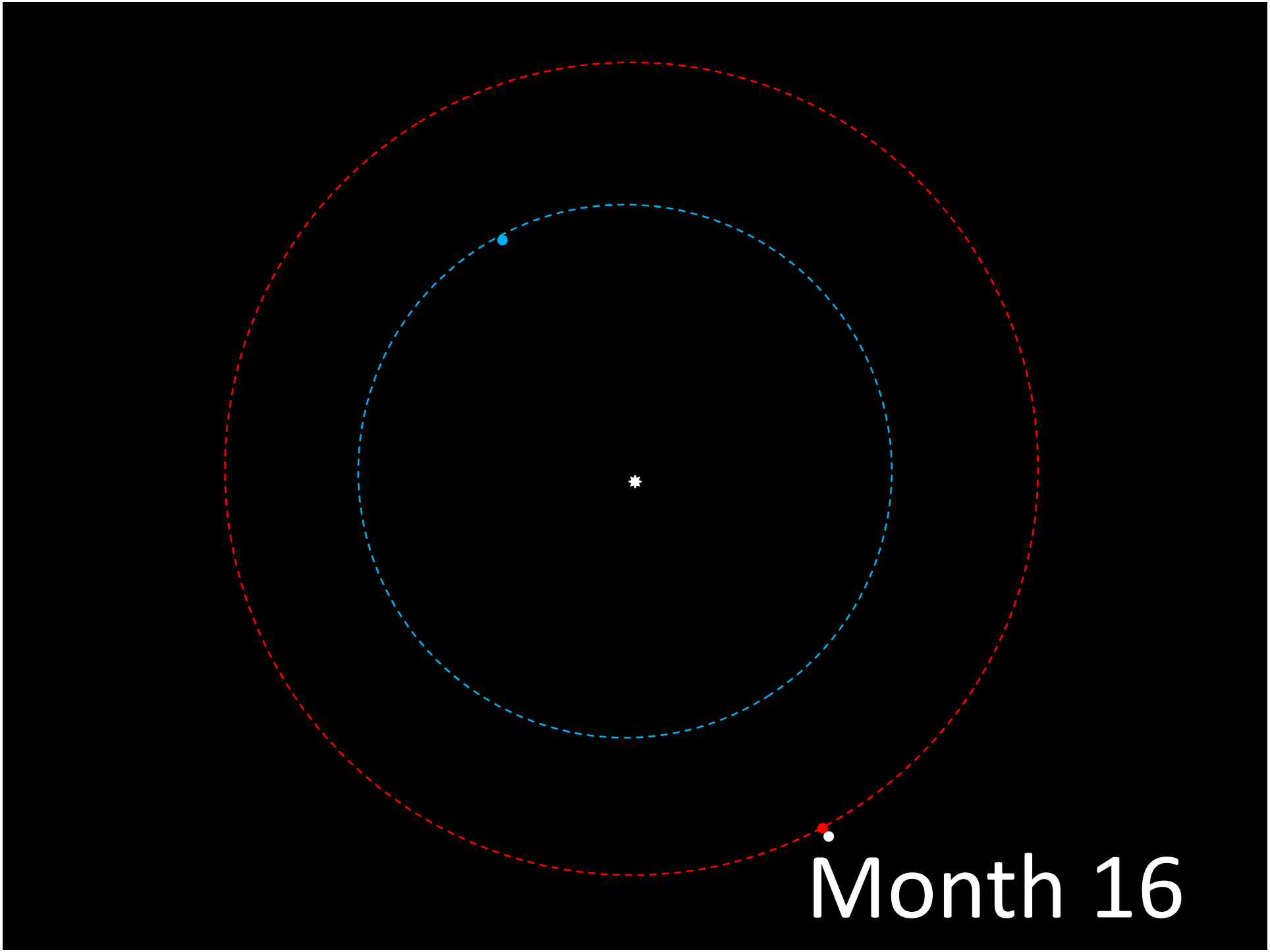
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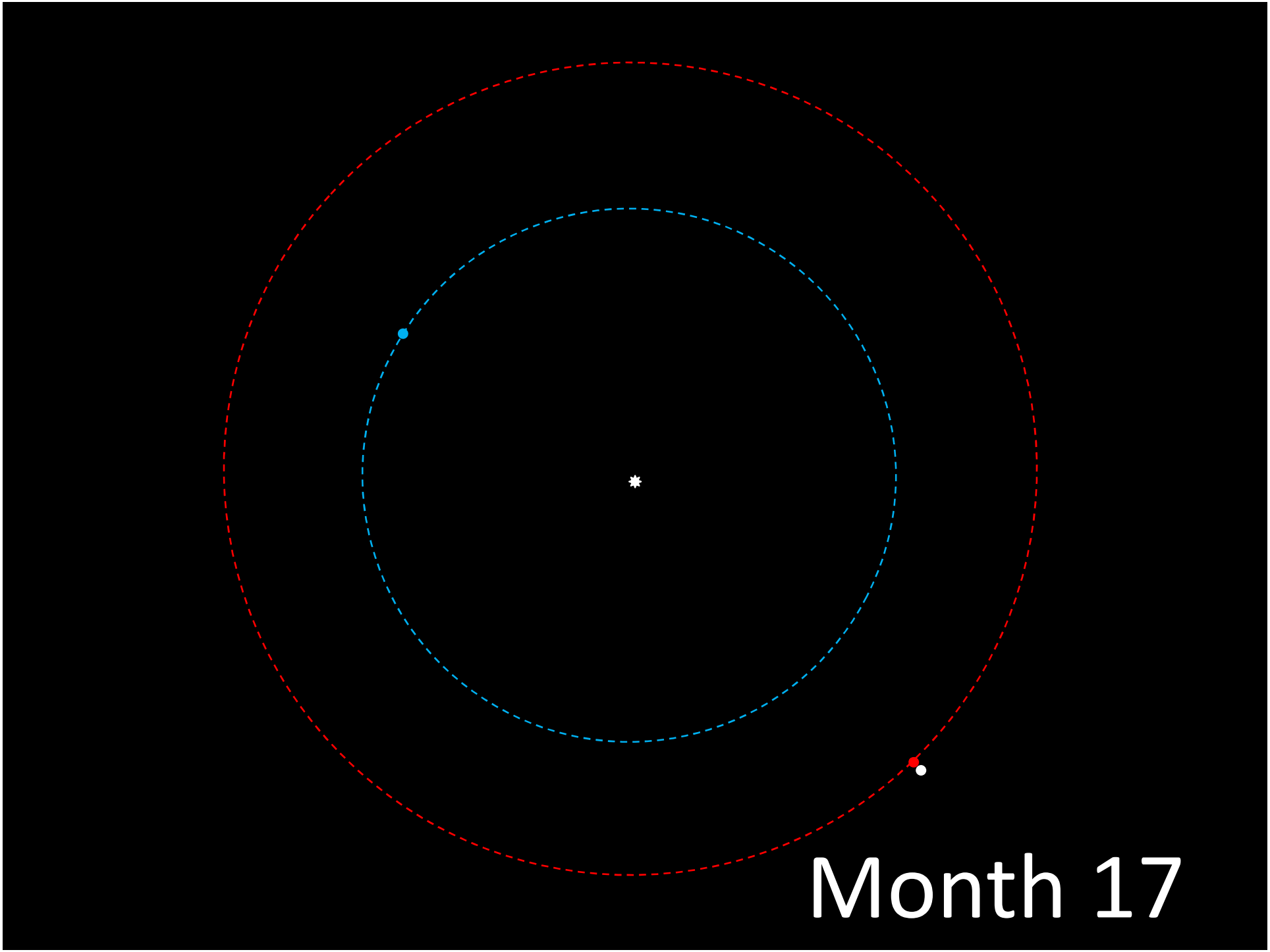
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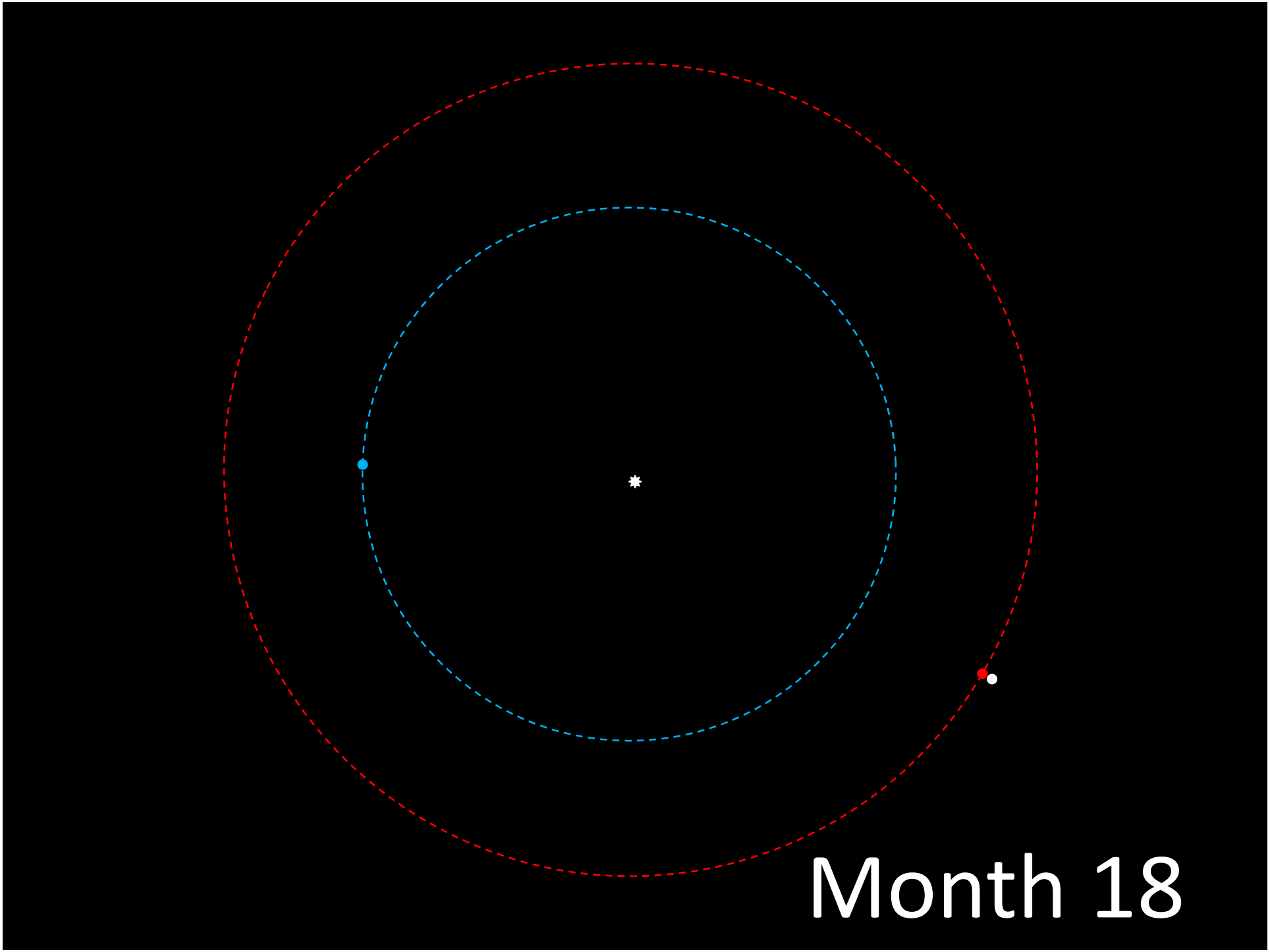
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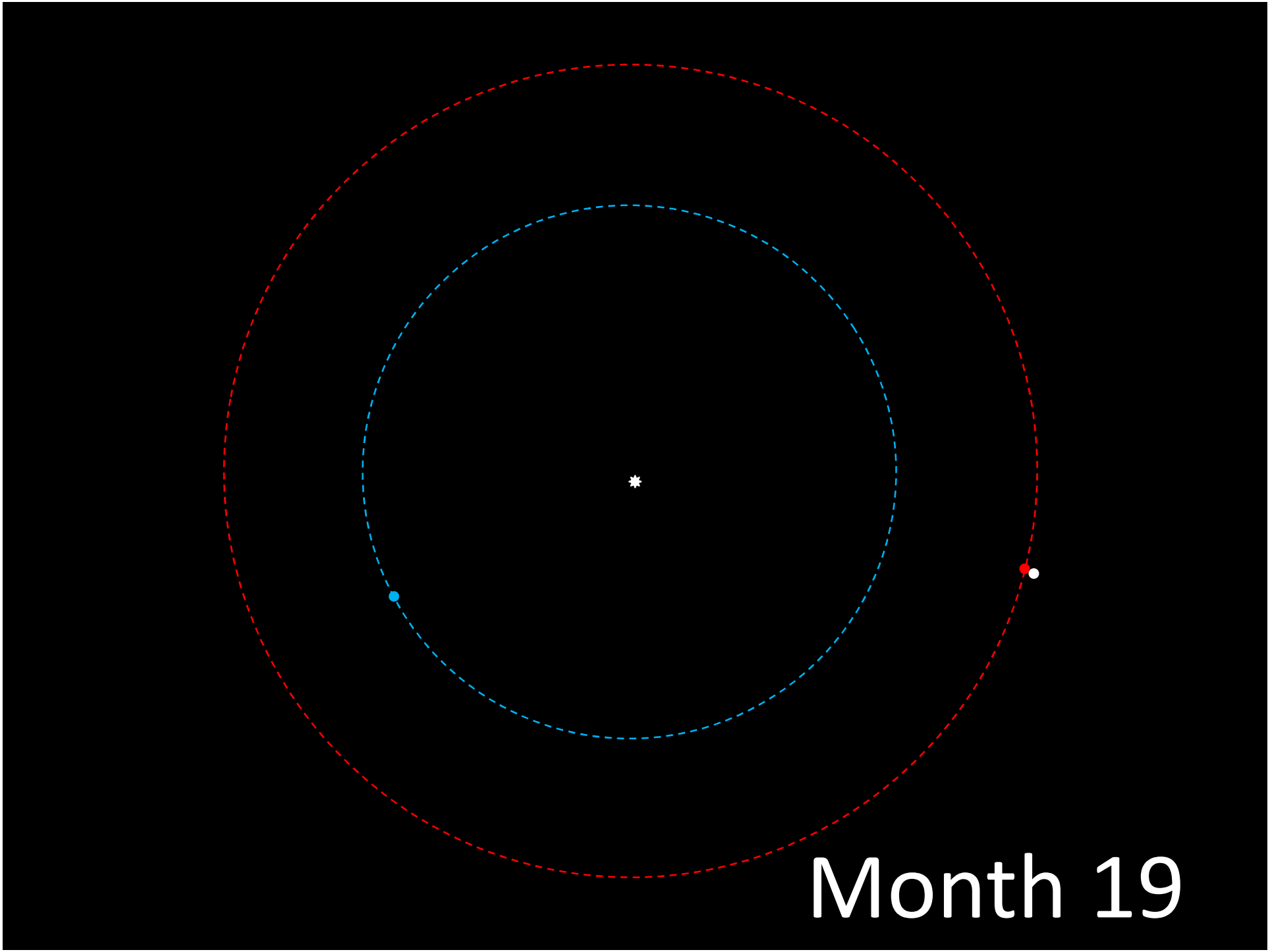
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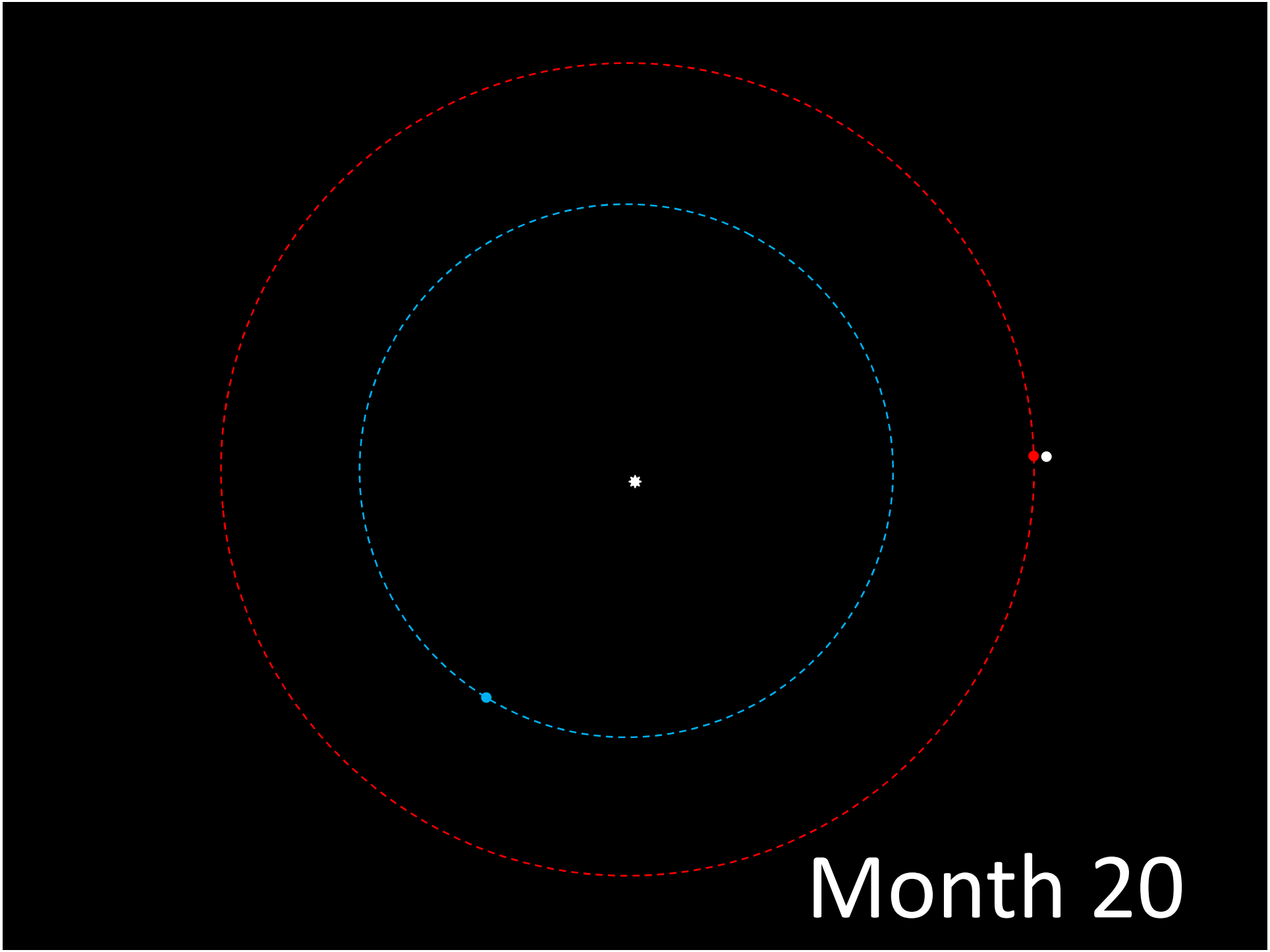
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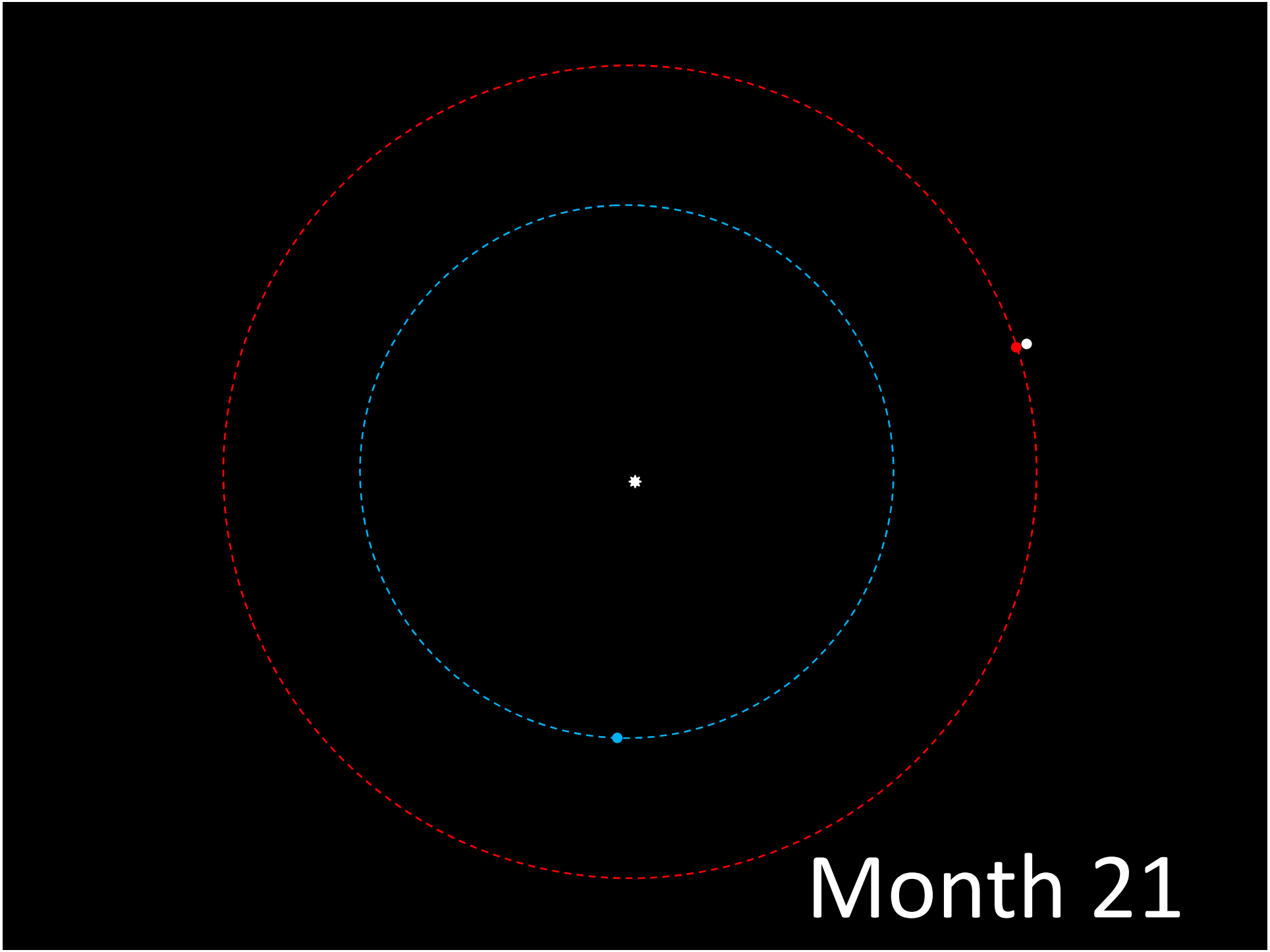
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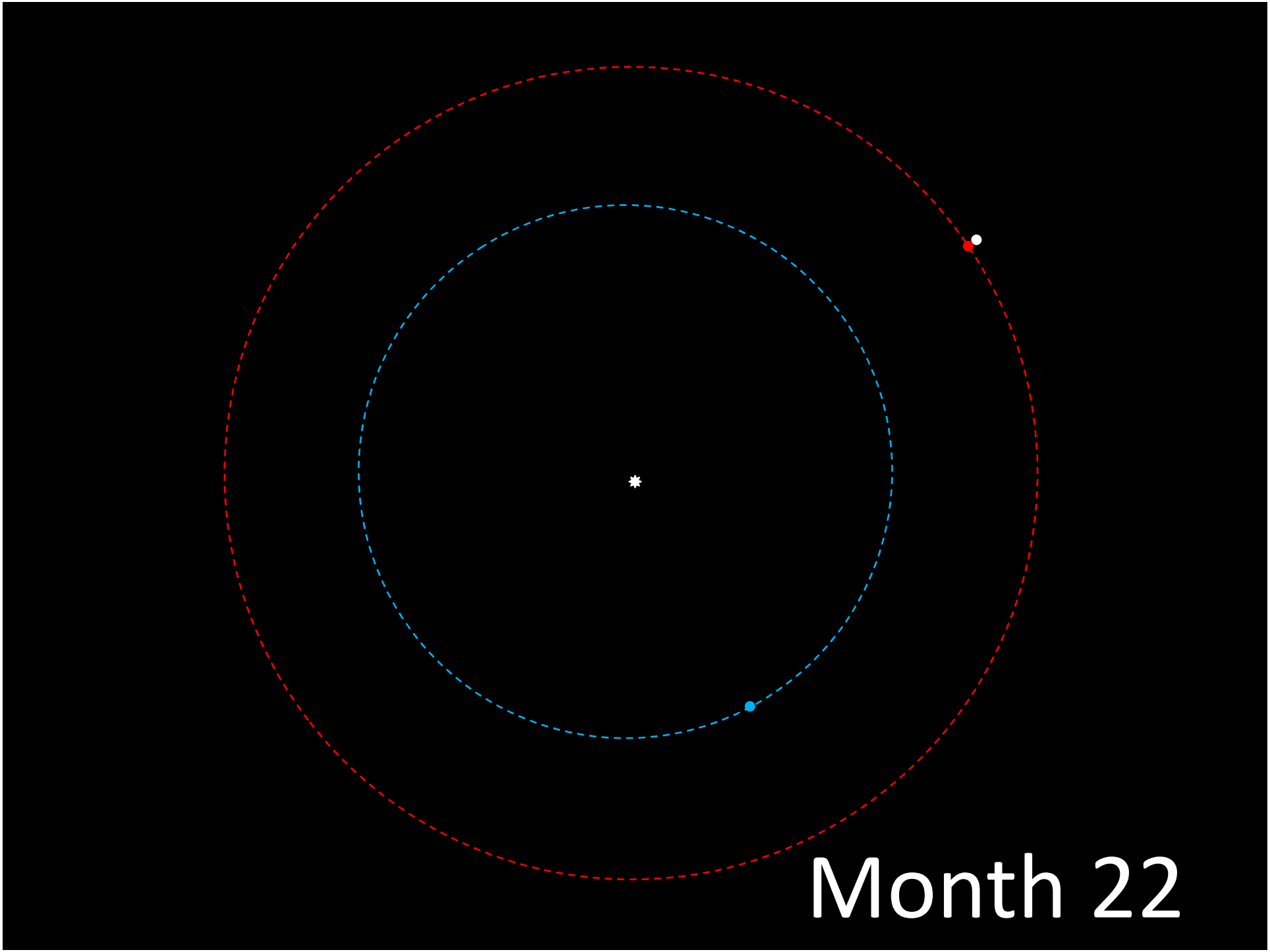
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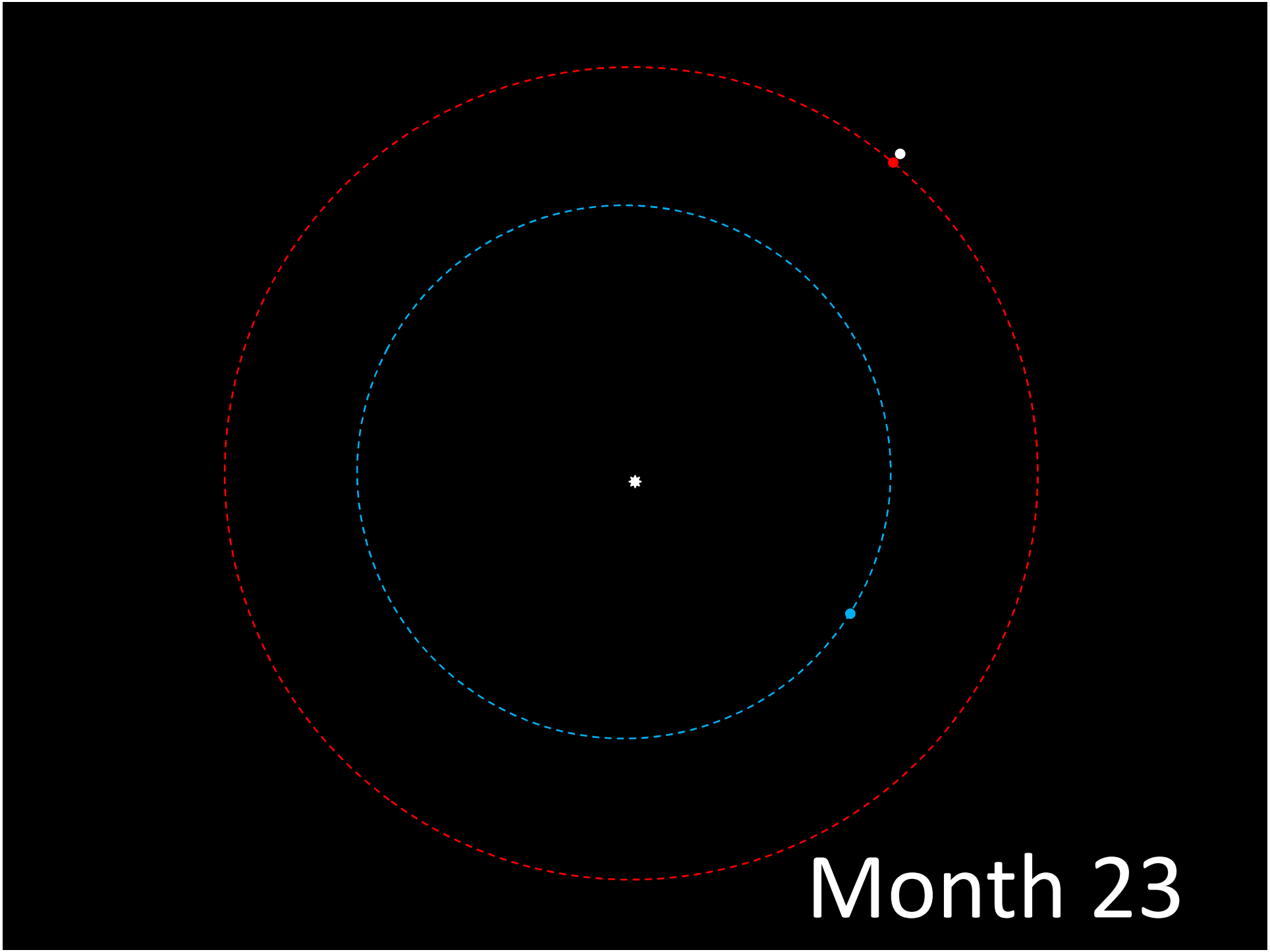
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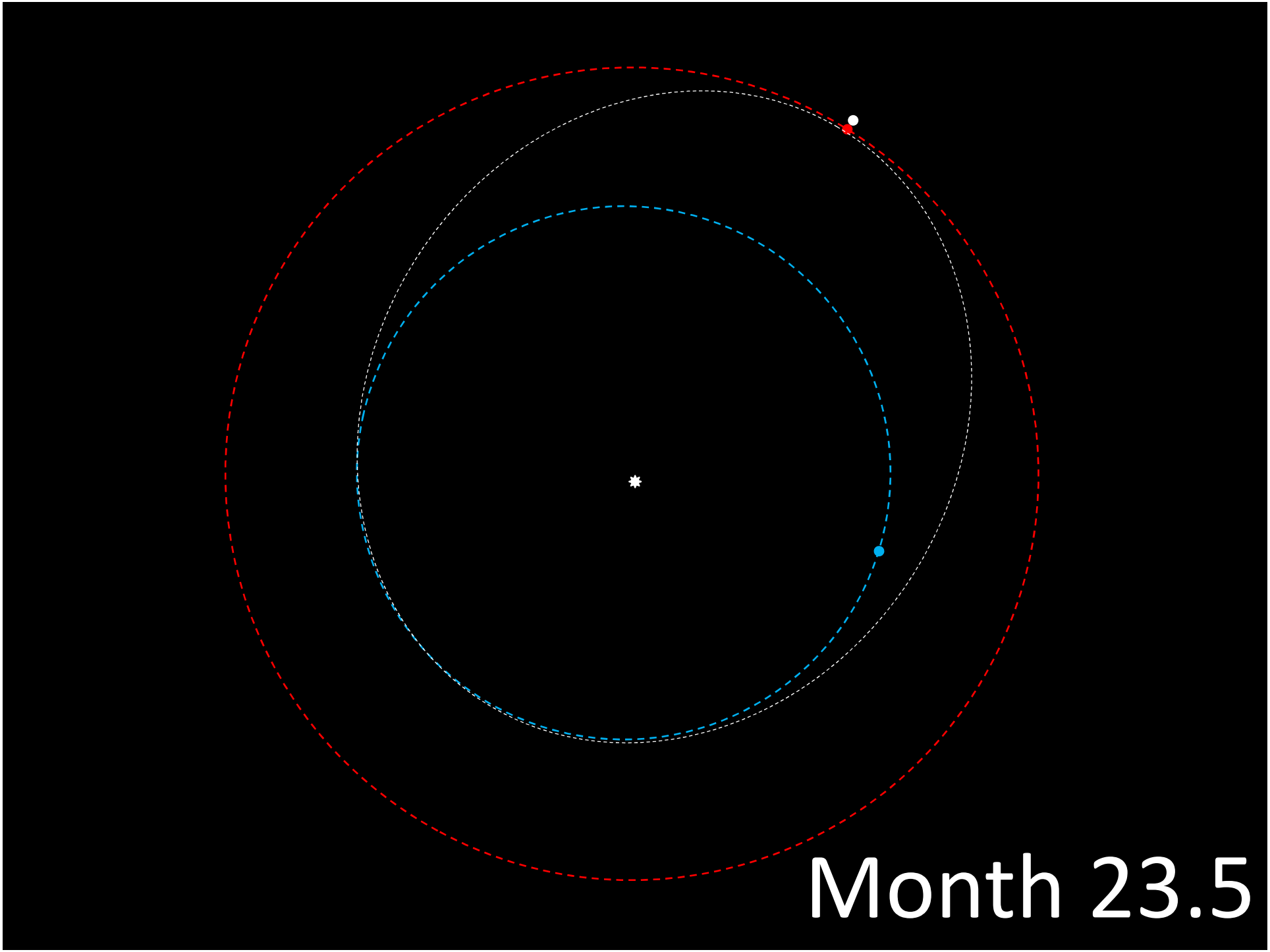
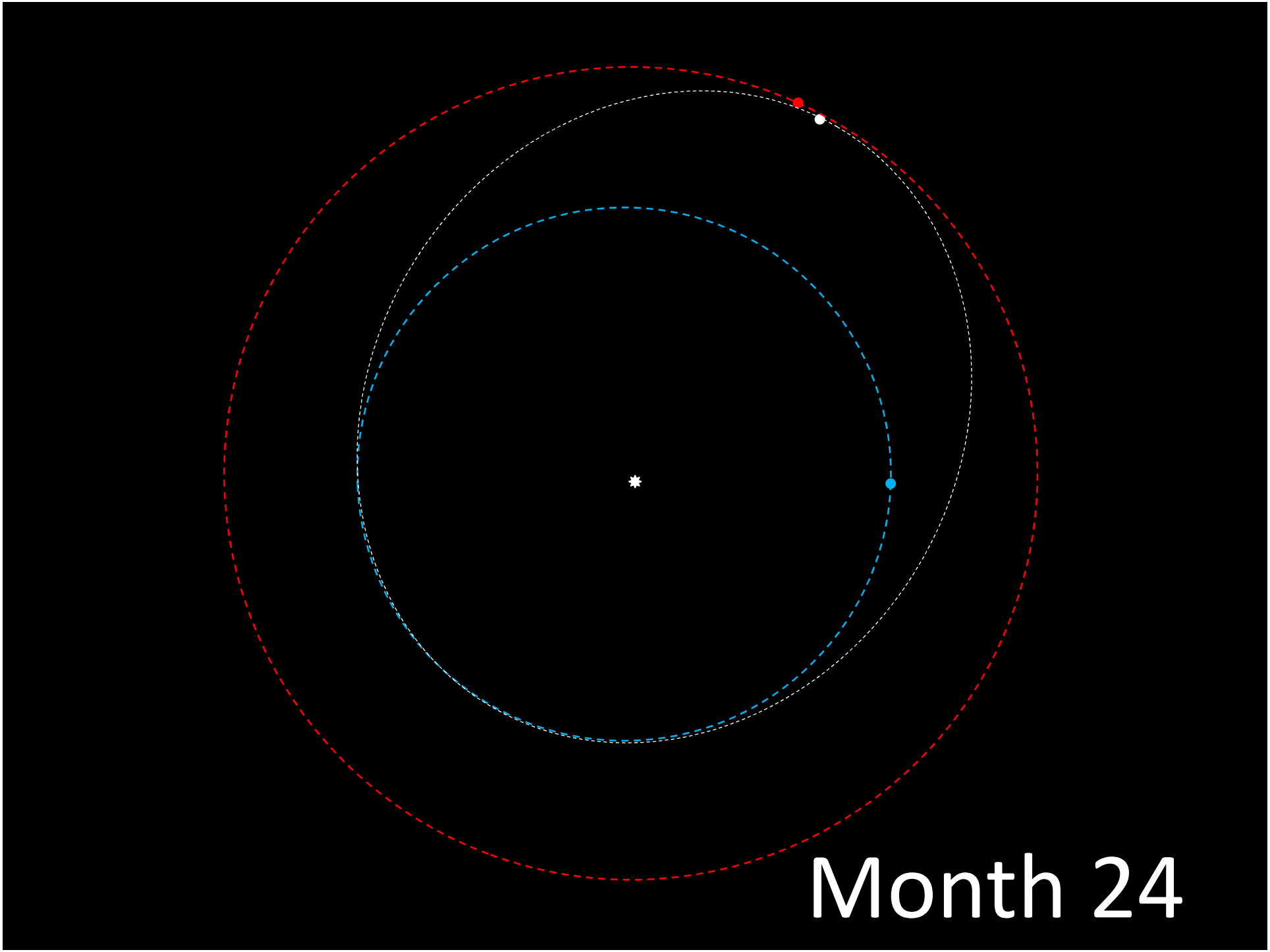
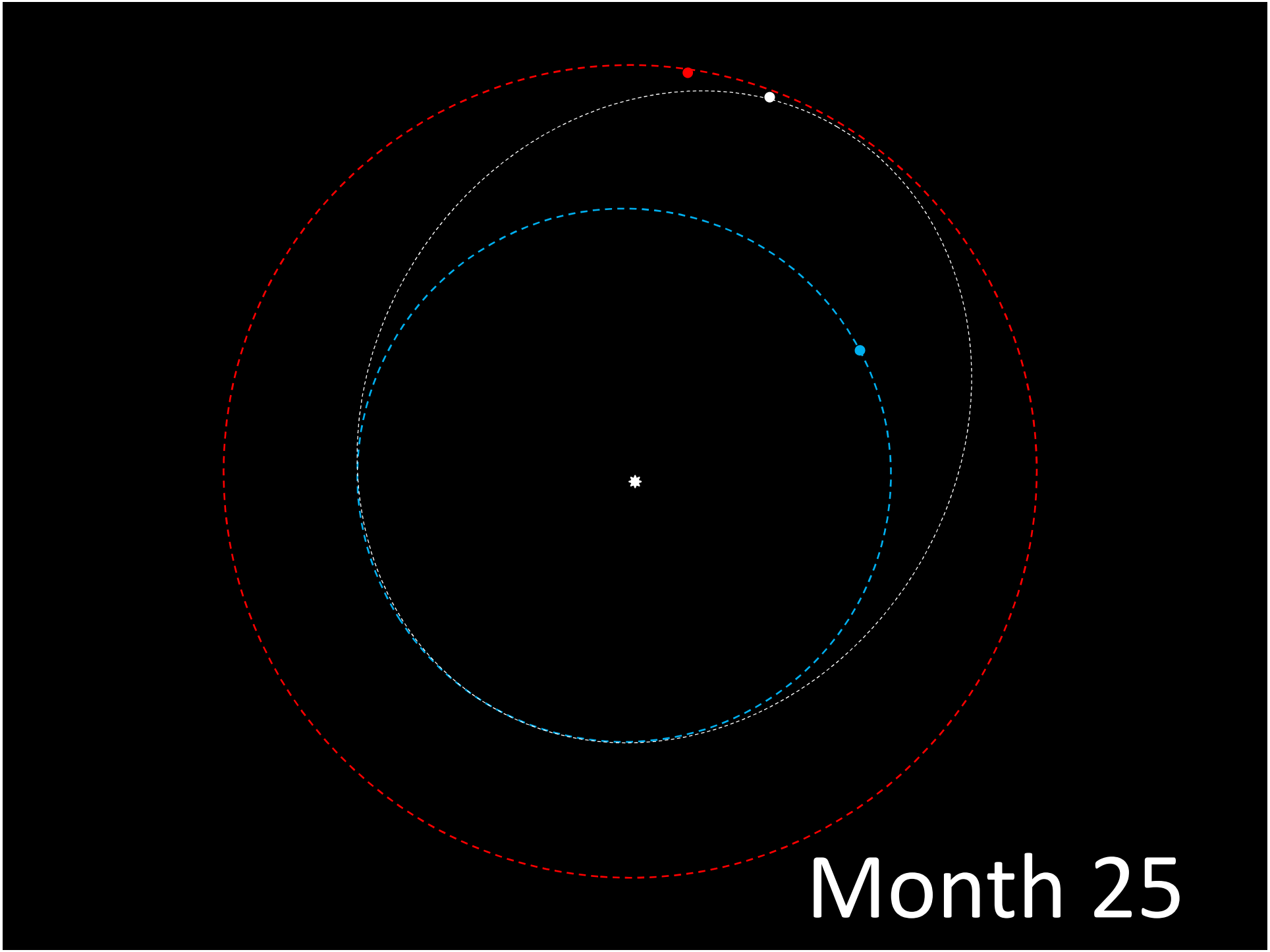

Month 23.5


Month 24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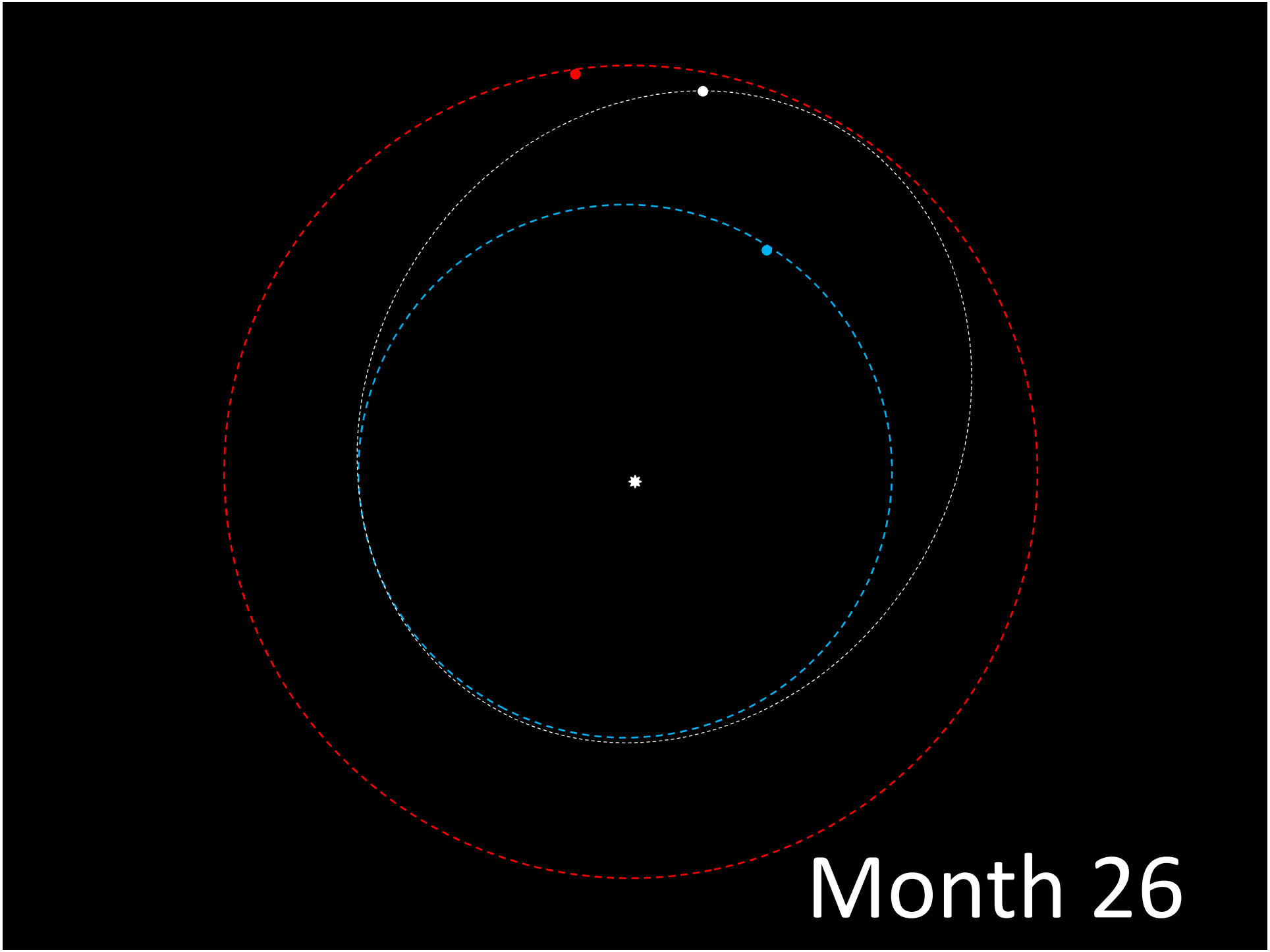
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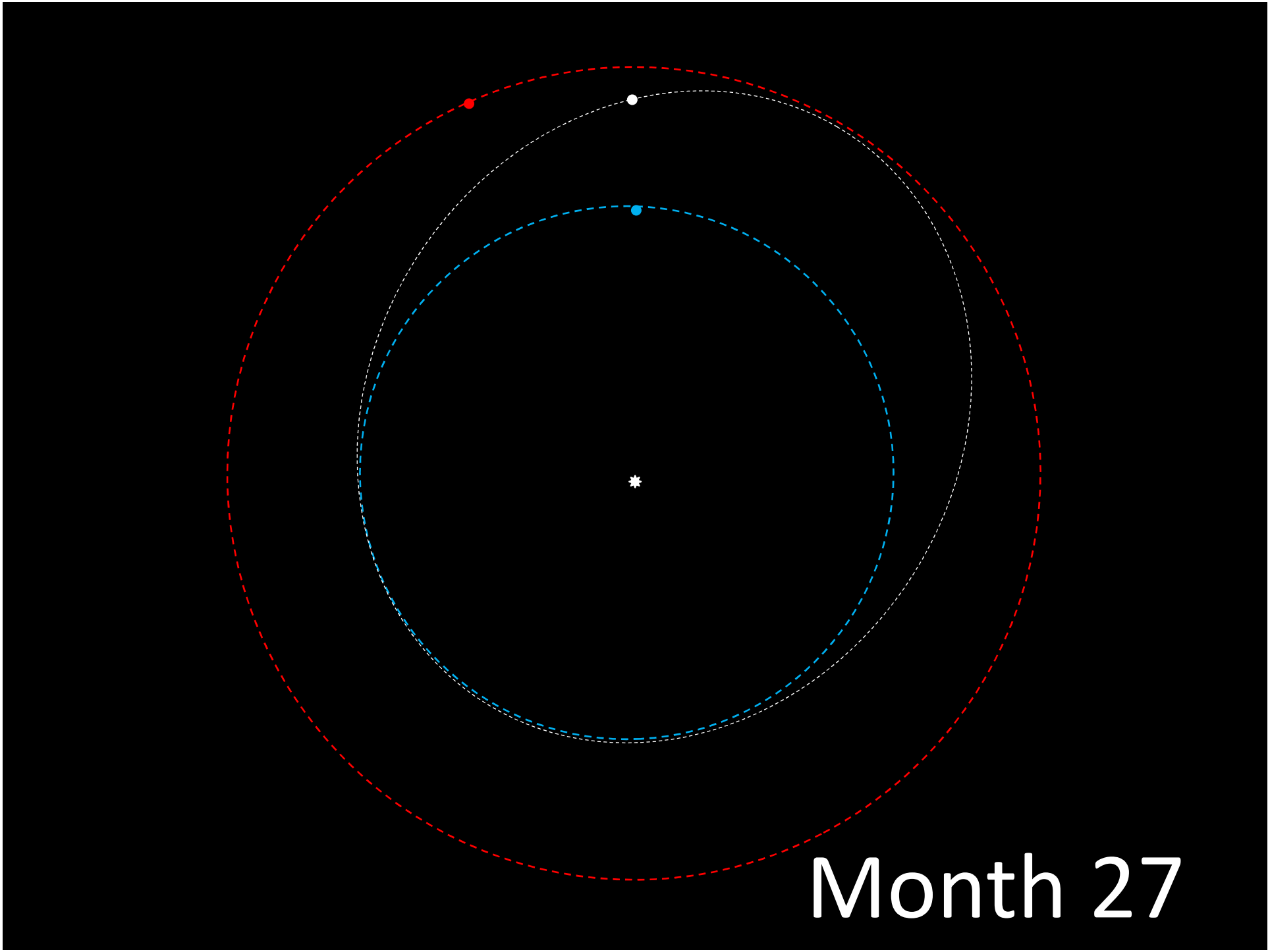
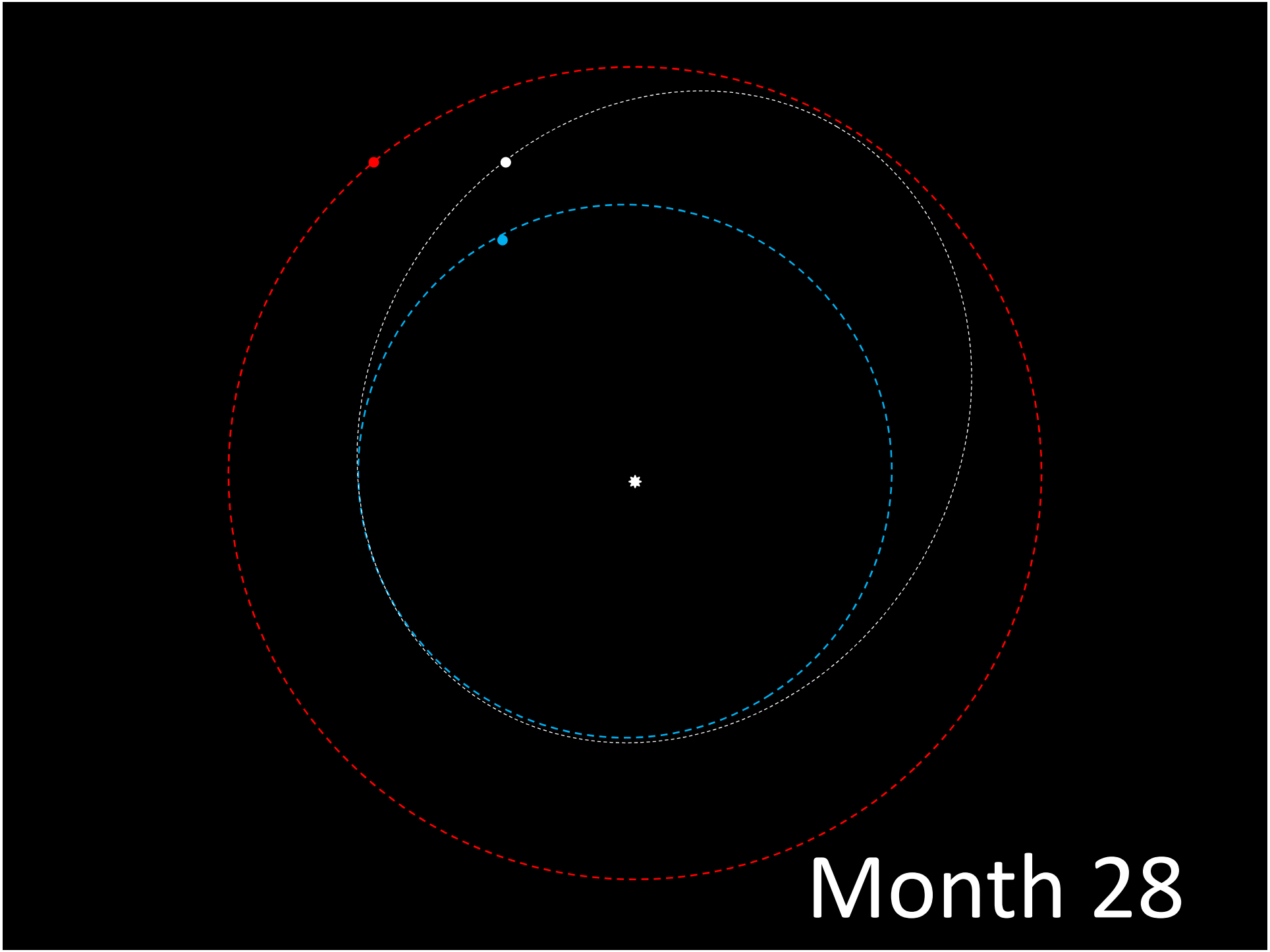

Month 27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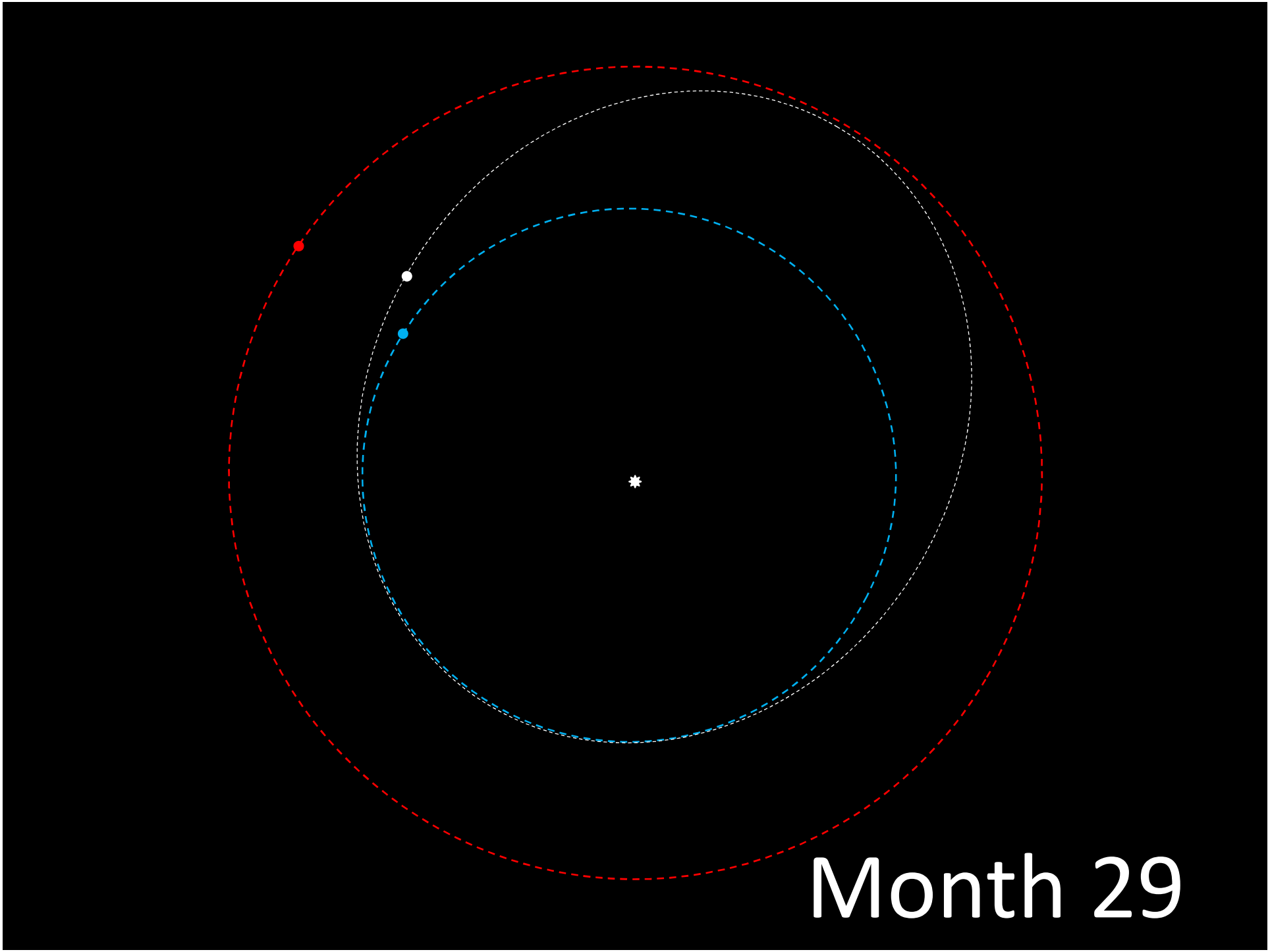
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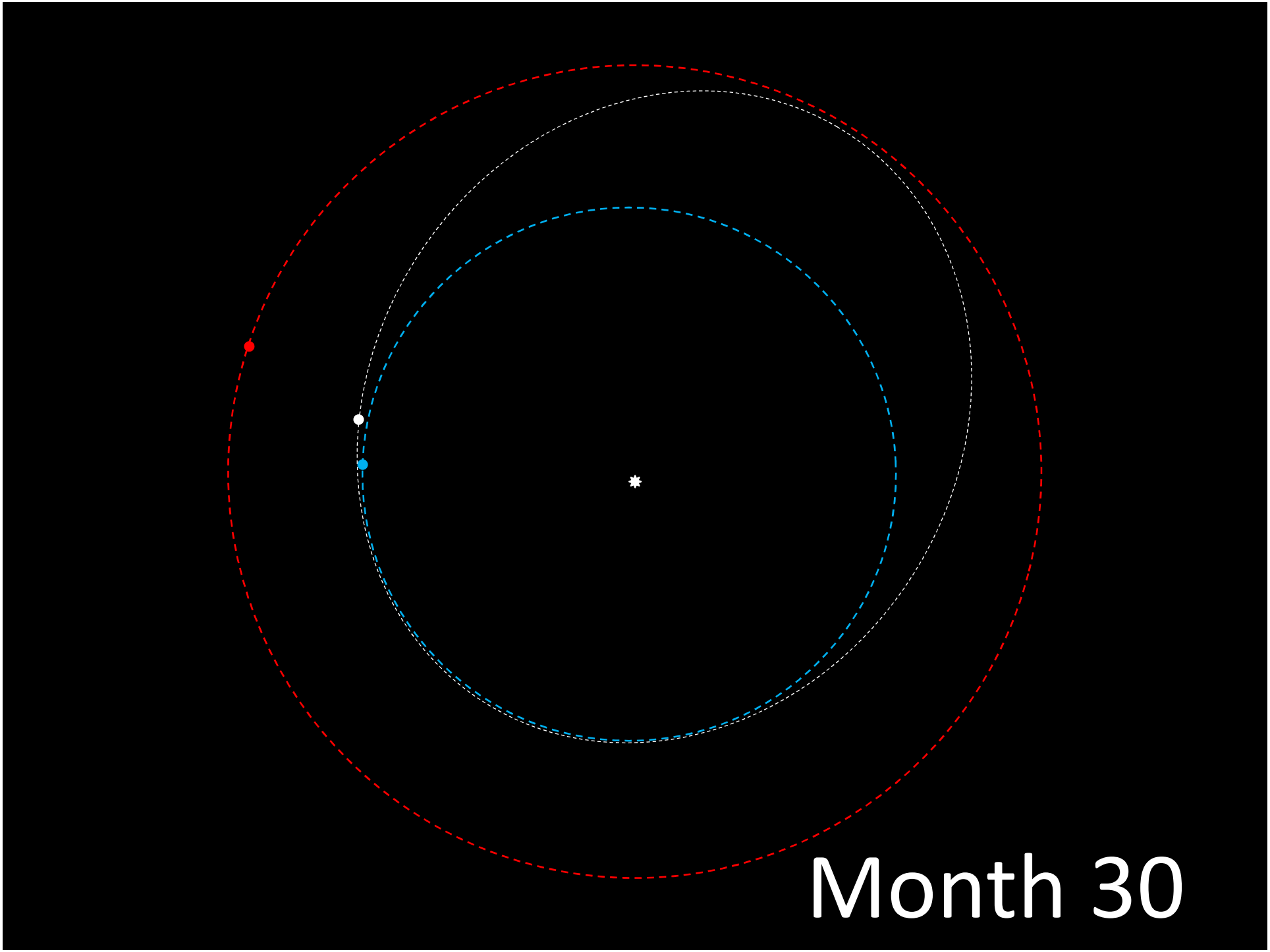
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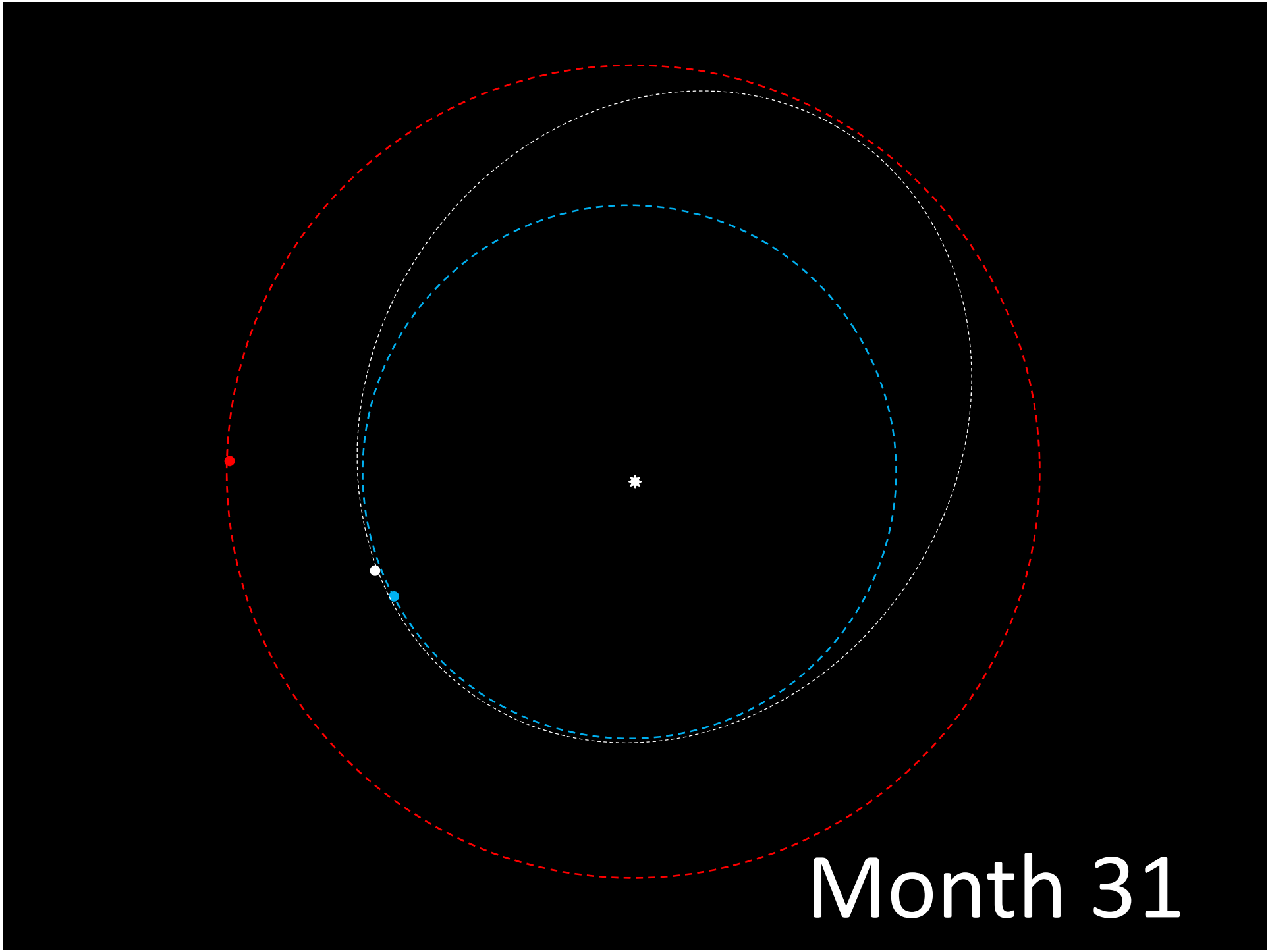
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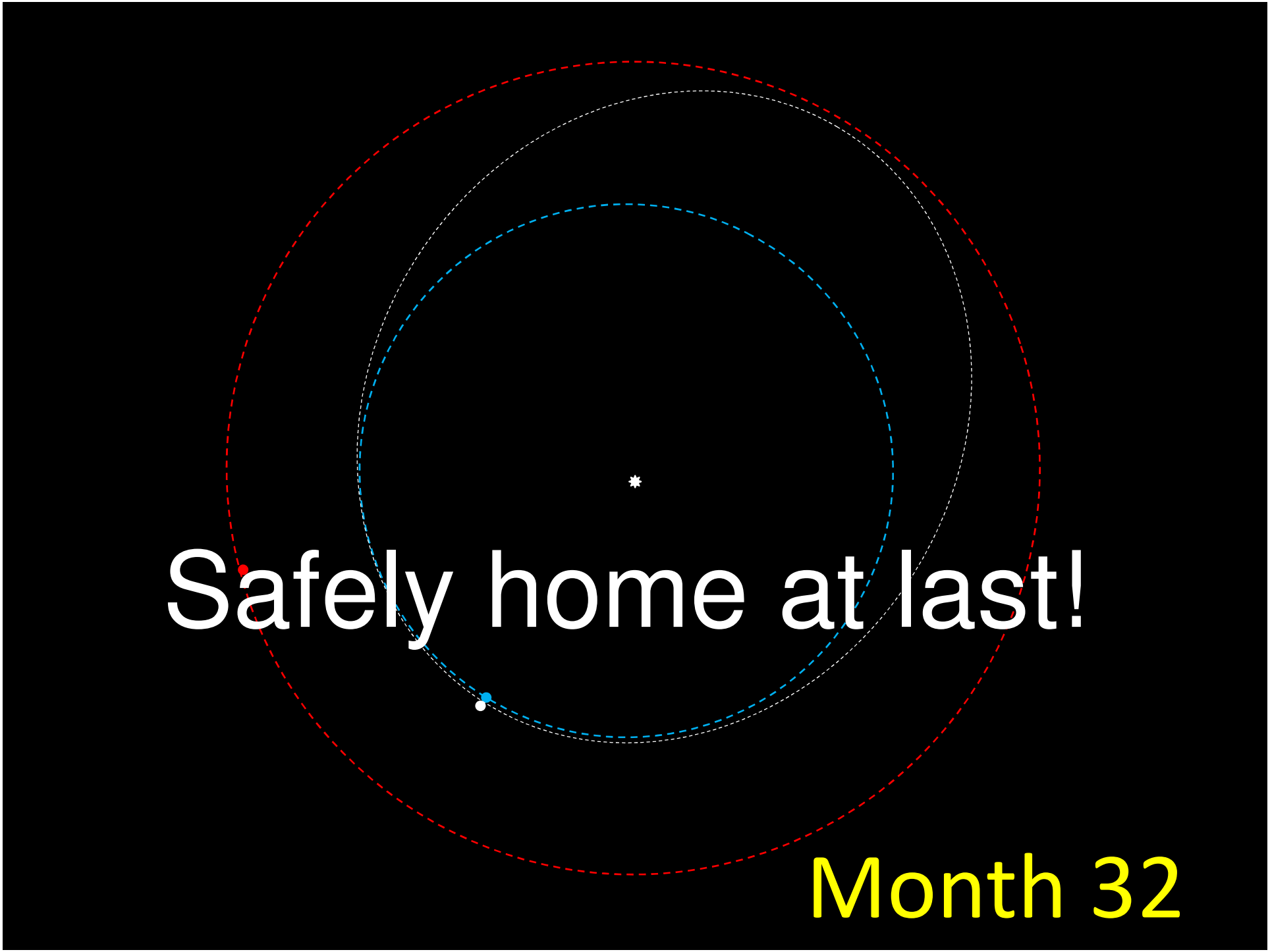

Safely home at last!
Month 32

?

+

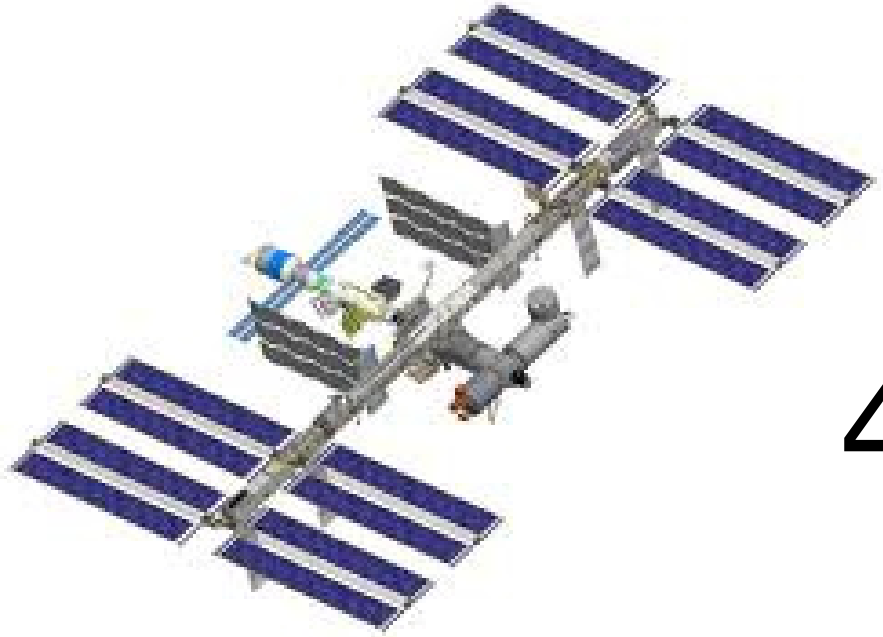
×9,150

+

×1,180

+

×280



420 tons

+

×9,150

+

×1,180

+

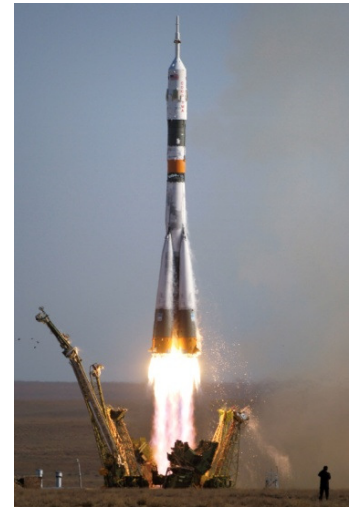
×280

×27

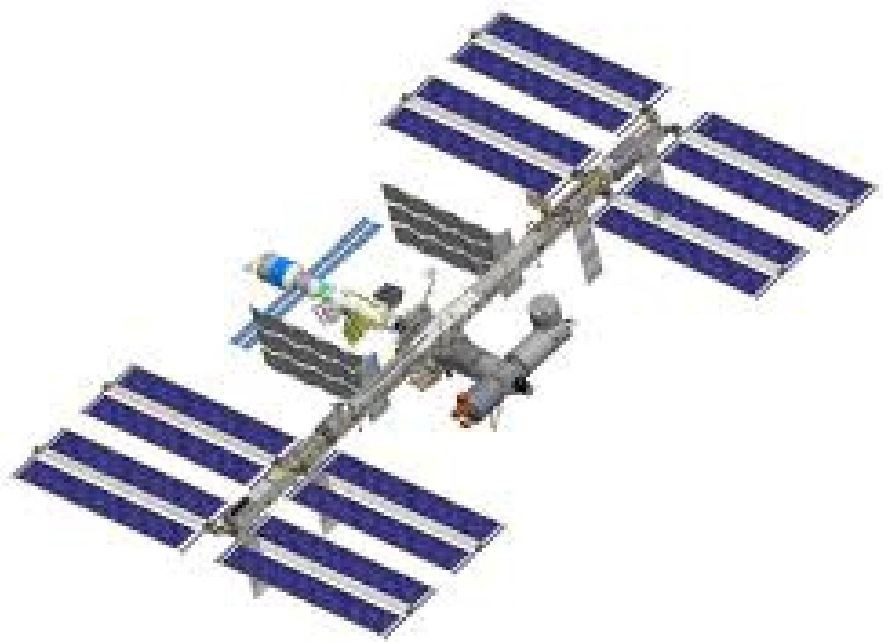
+

×2

+



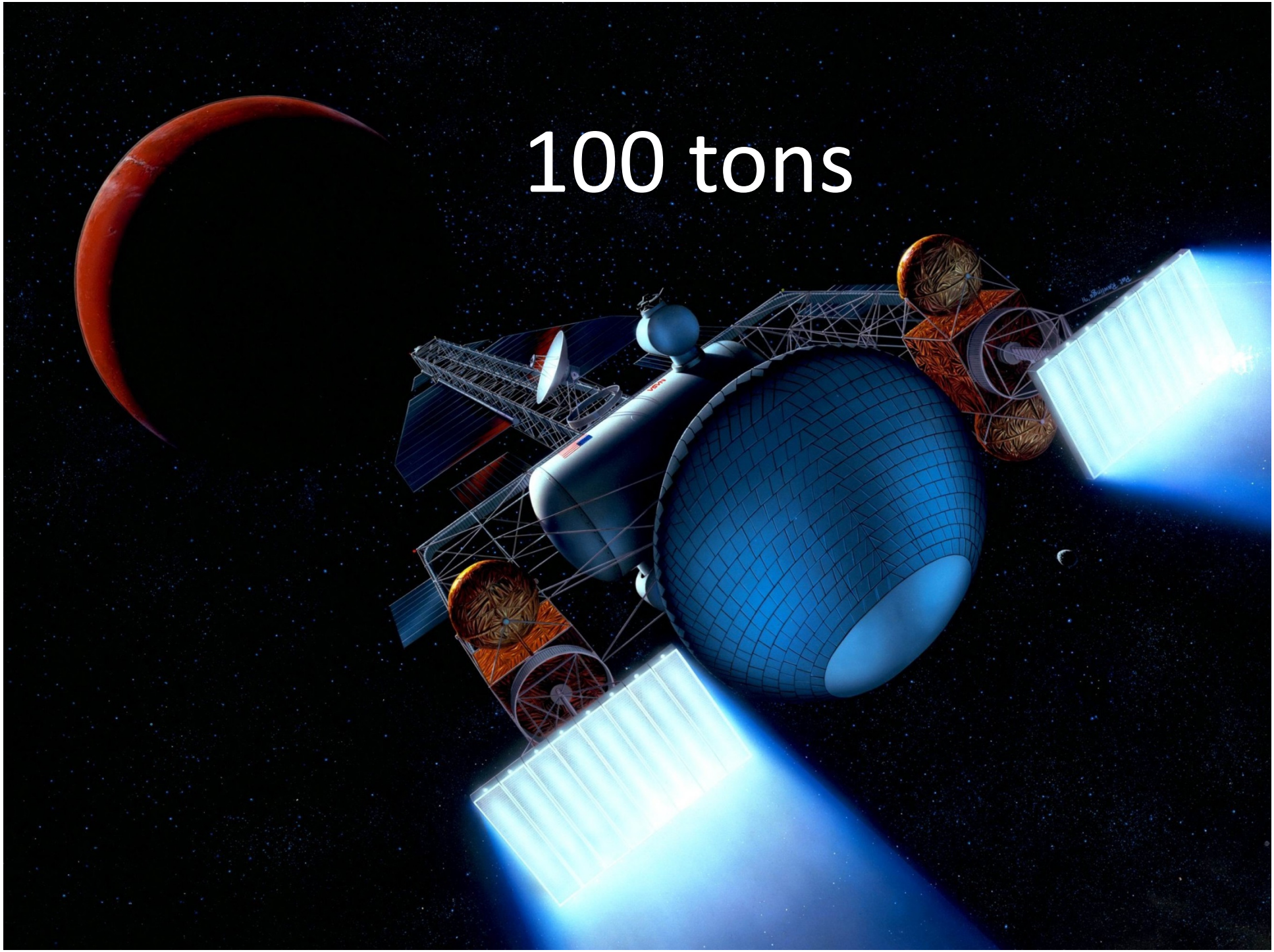
×2

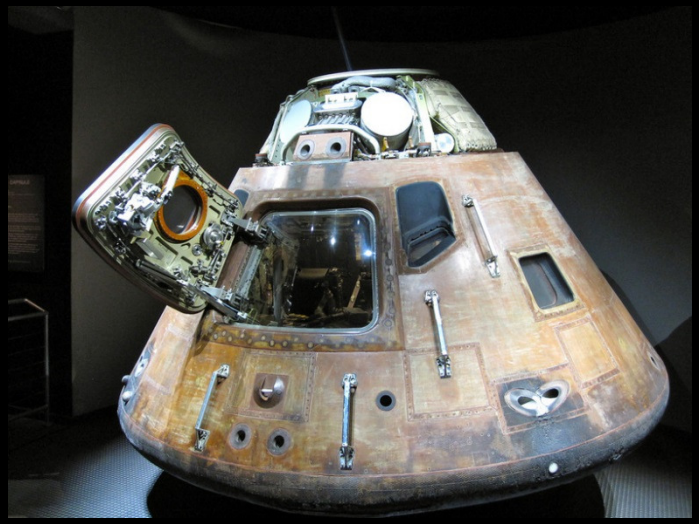


420 tons

RECYCLE

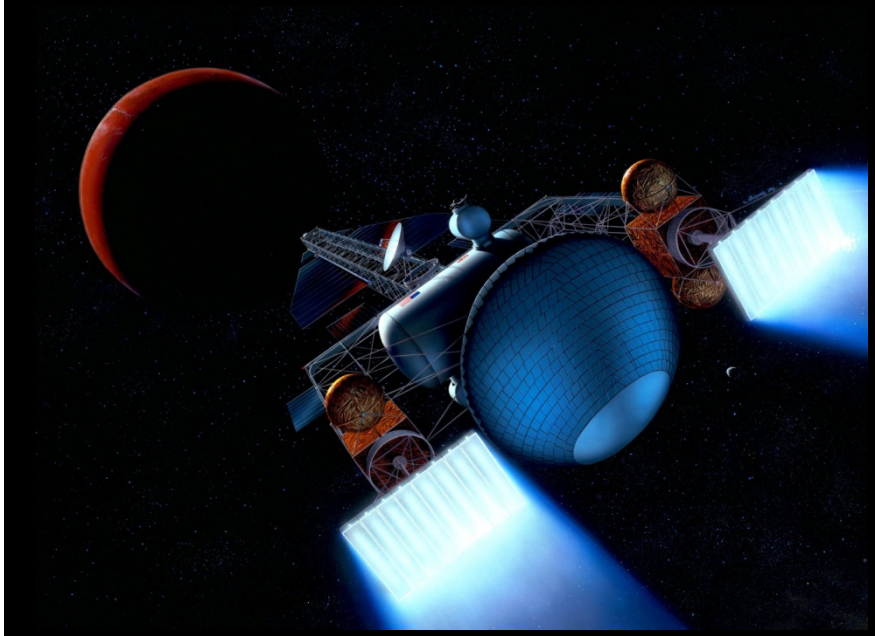
100 tons





6 tons

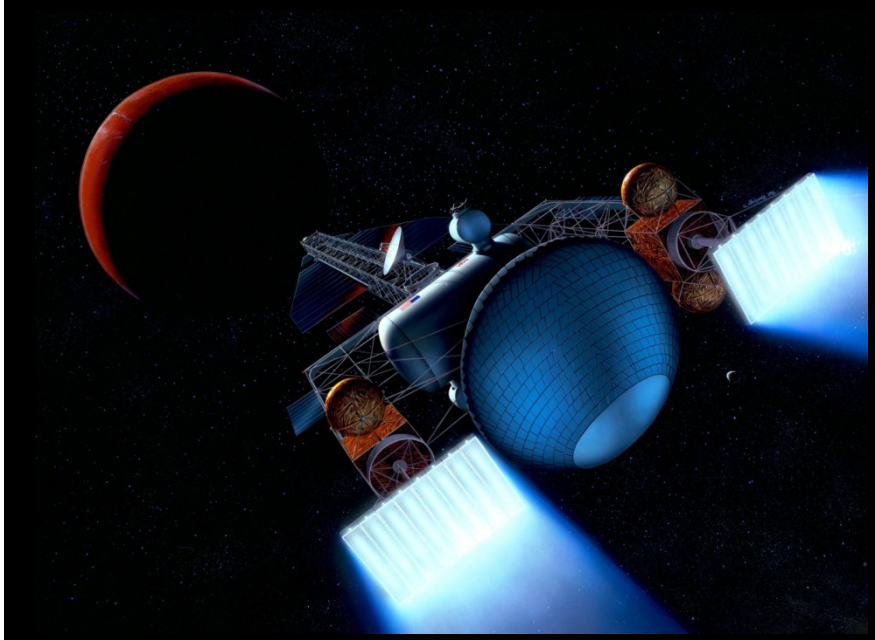
3,350 tons



100 tons

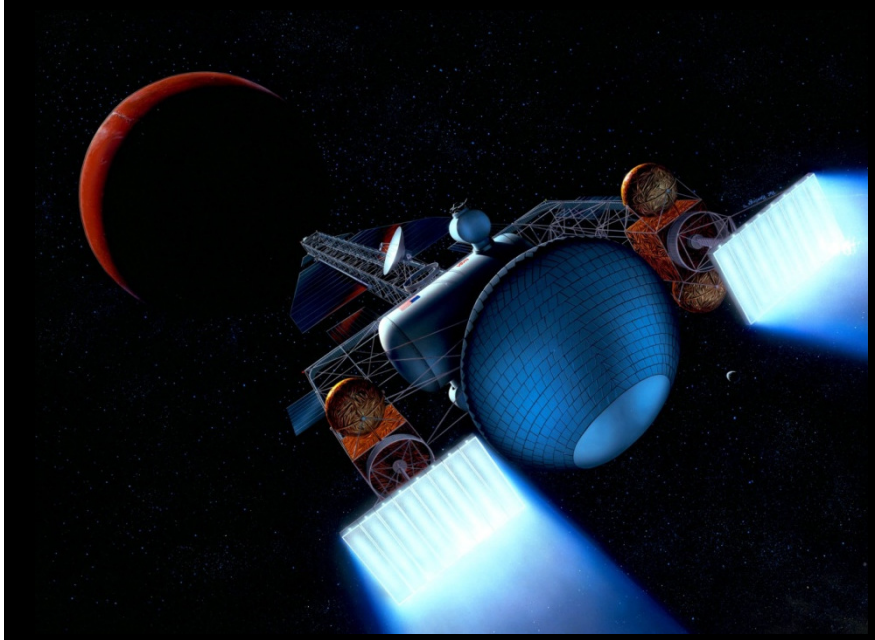
?

85,000 tons



100 tons

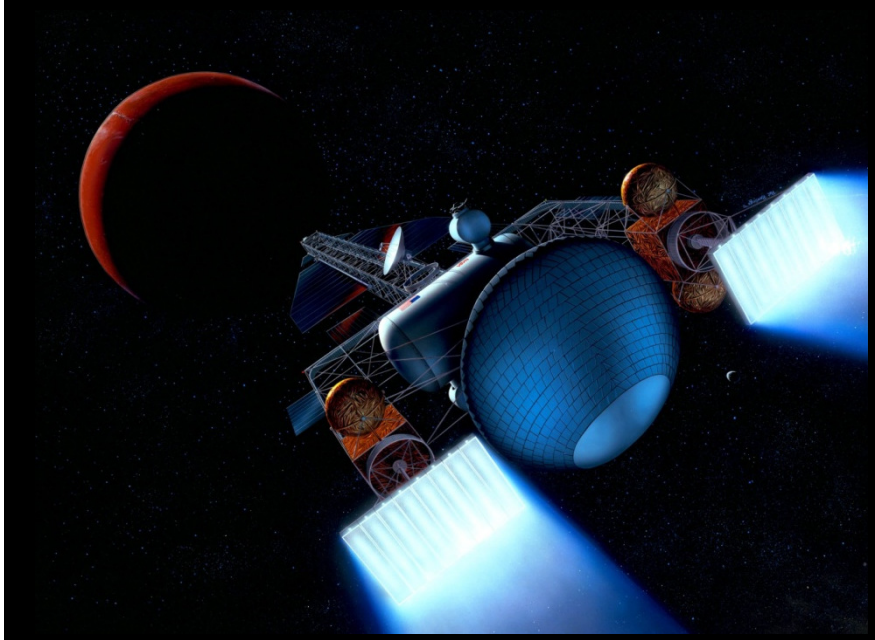
85,000 tons



100 tons

× 39

85,000 tons

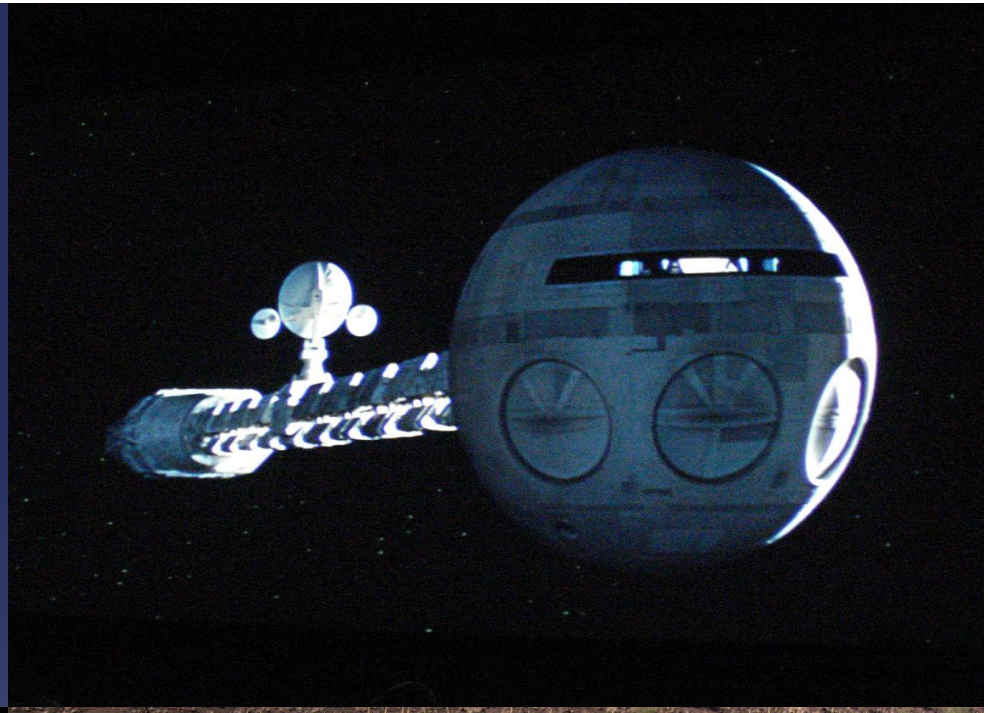


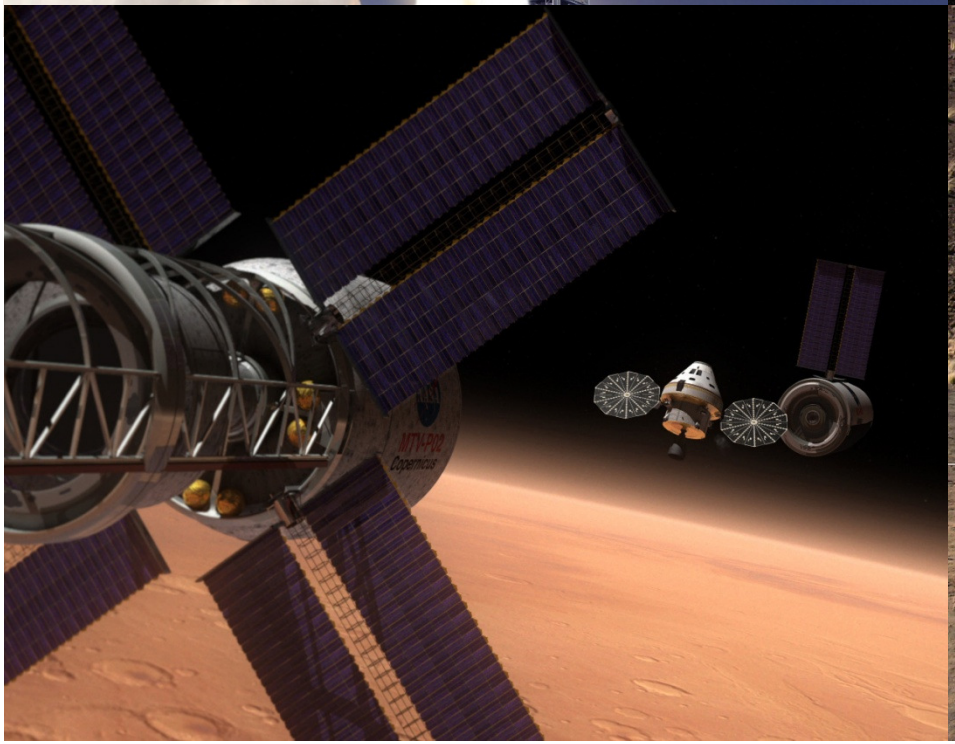
100 tons

× 25

85,000 tons

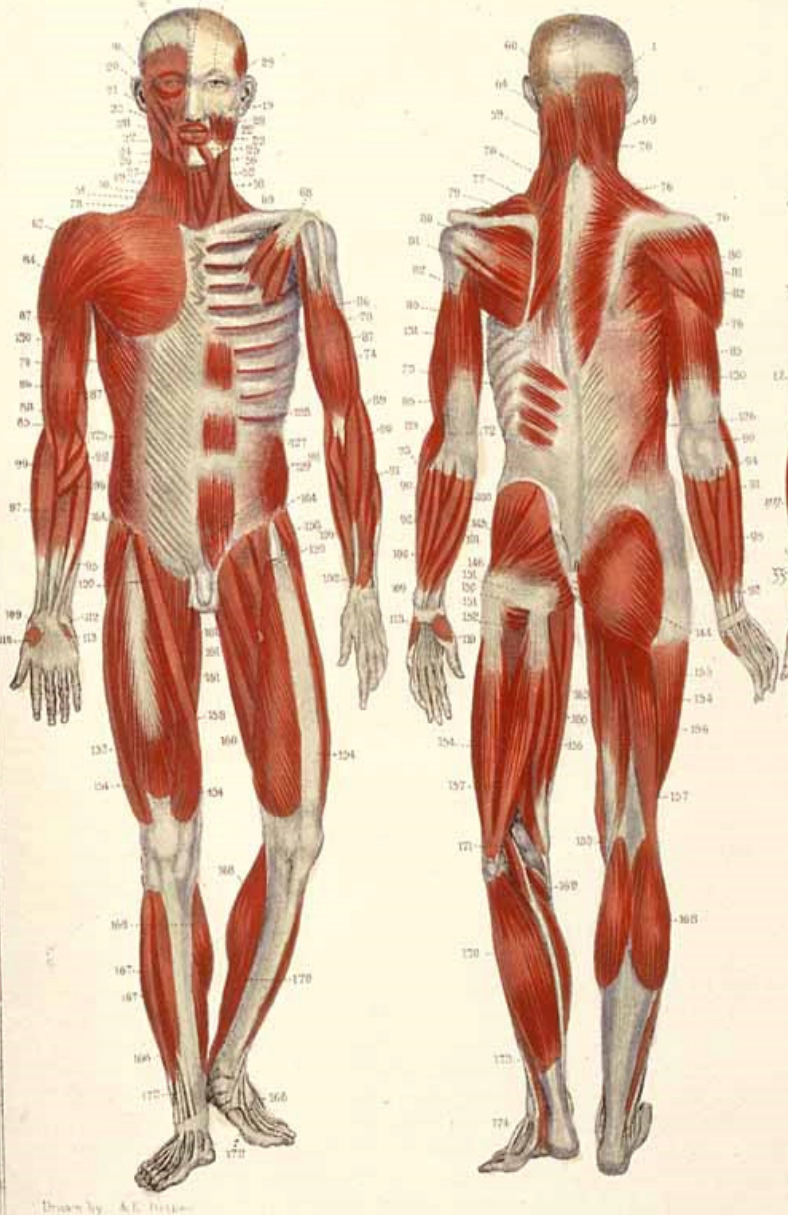
USA



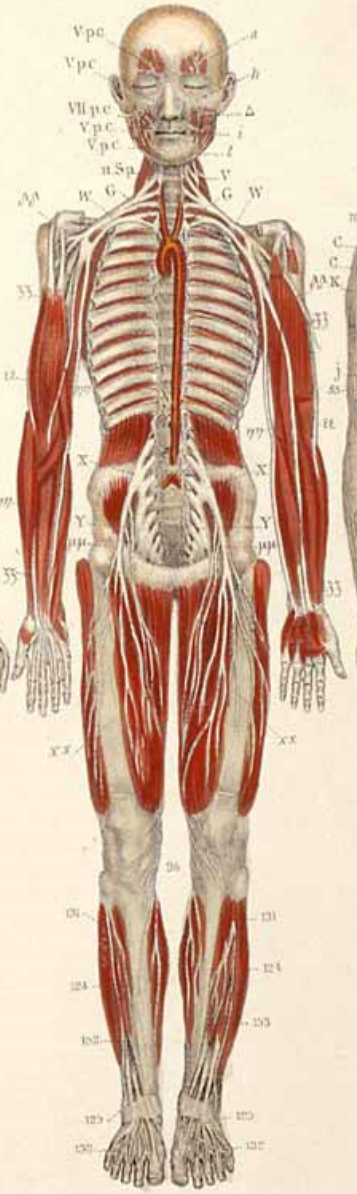

MTV-PR
Copernicus

RECAPITULATION.

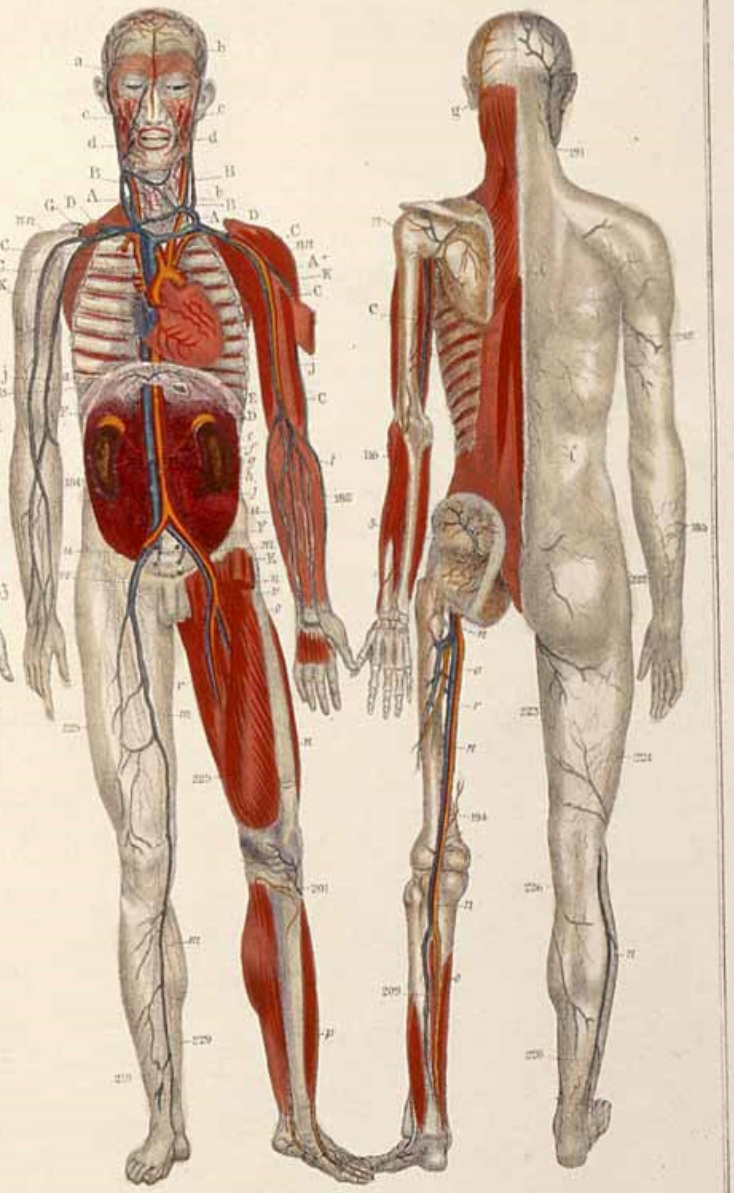
Myography.

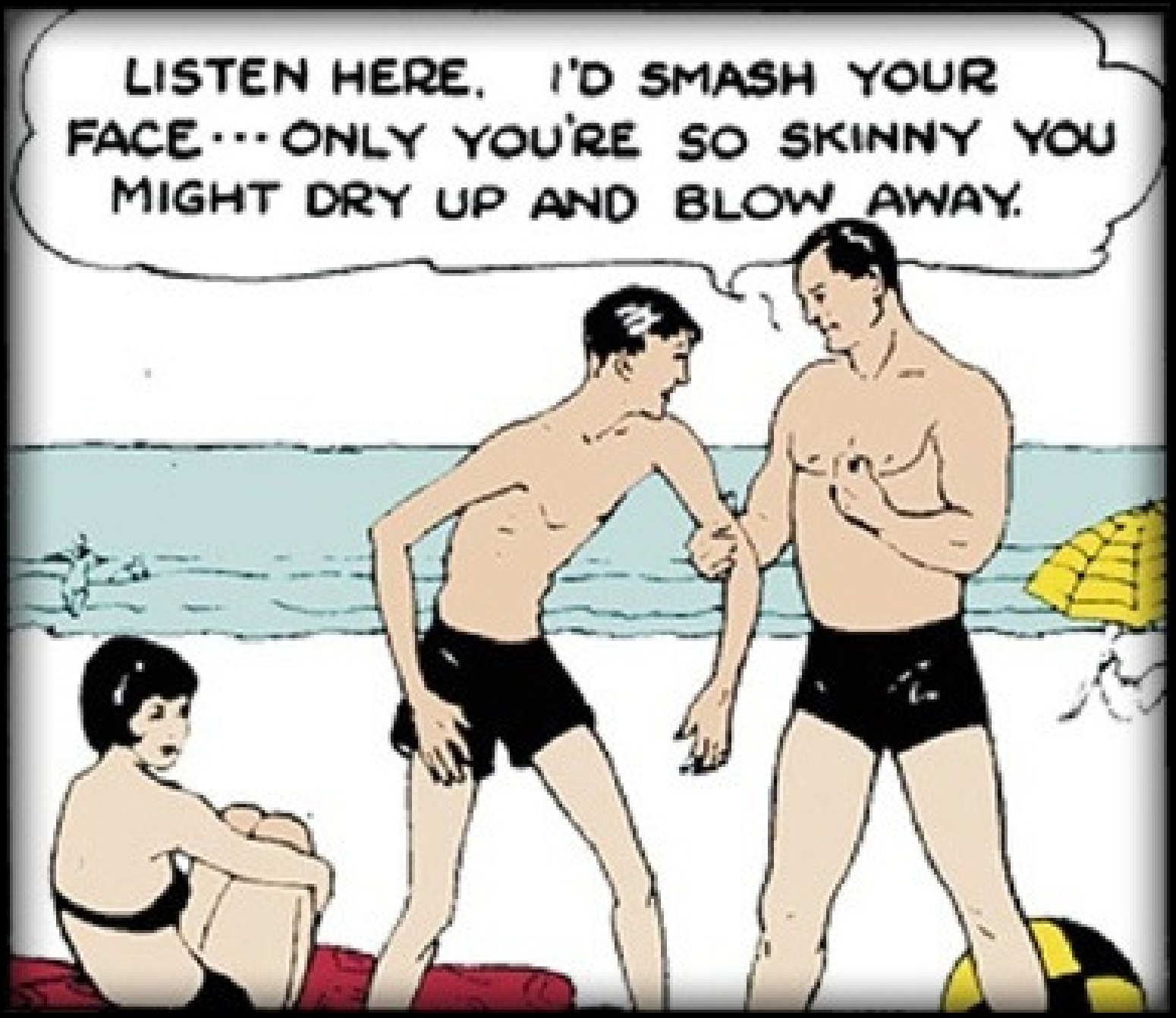


Neurography.

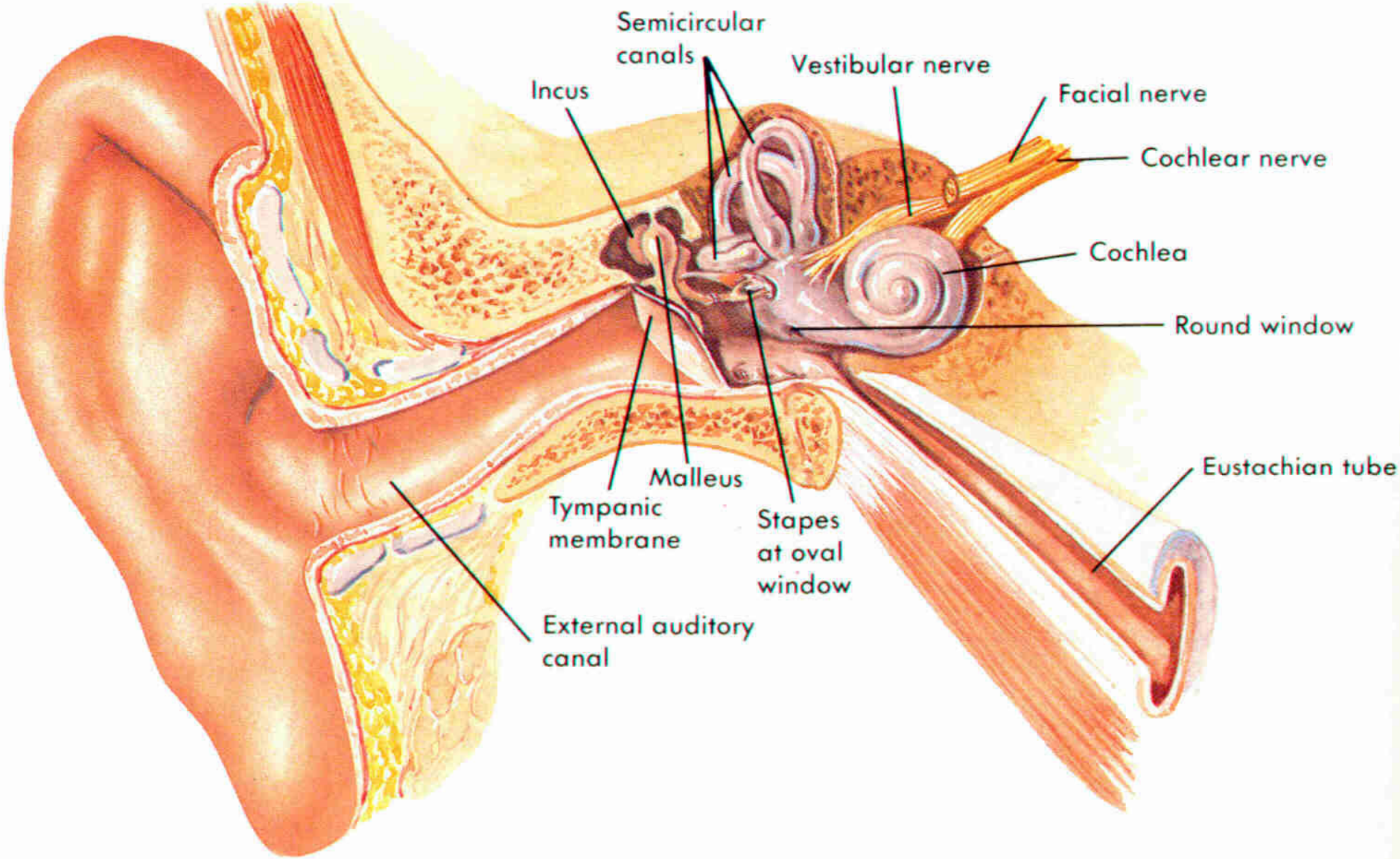


Angeography.



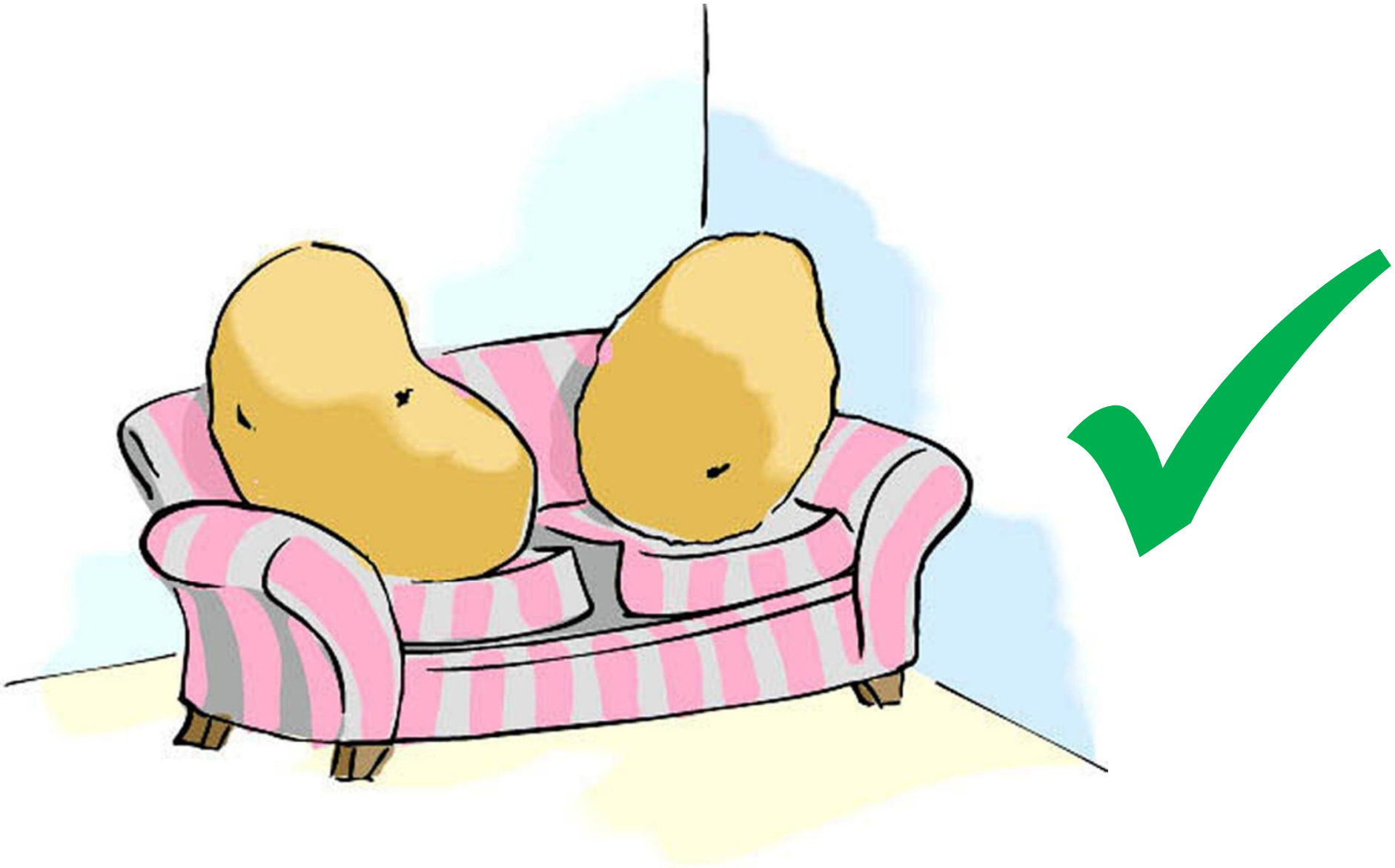

LISTEN HERE. I'D SMASH YOUR FACE··· ONLY YOU'RE SO SKINNY YOU MIGHT DRY UP AND BLOW AWAY.

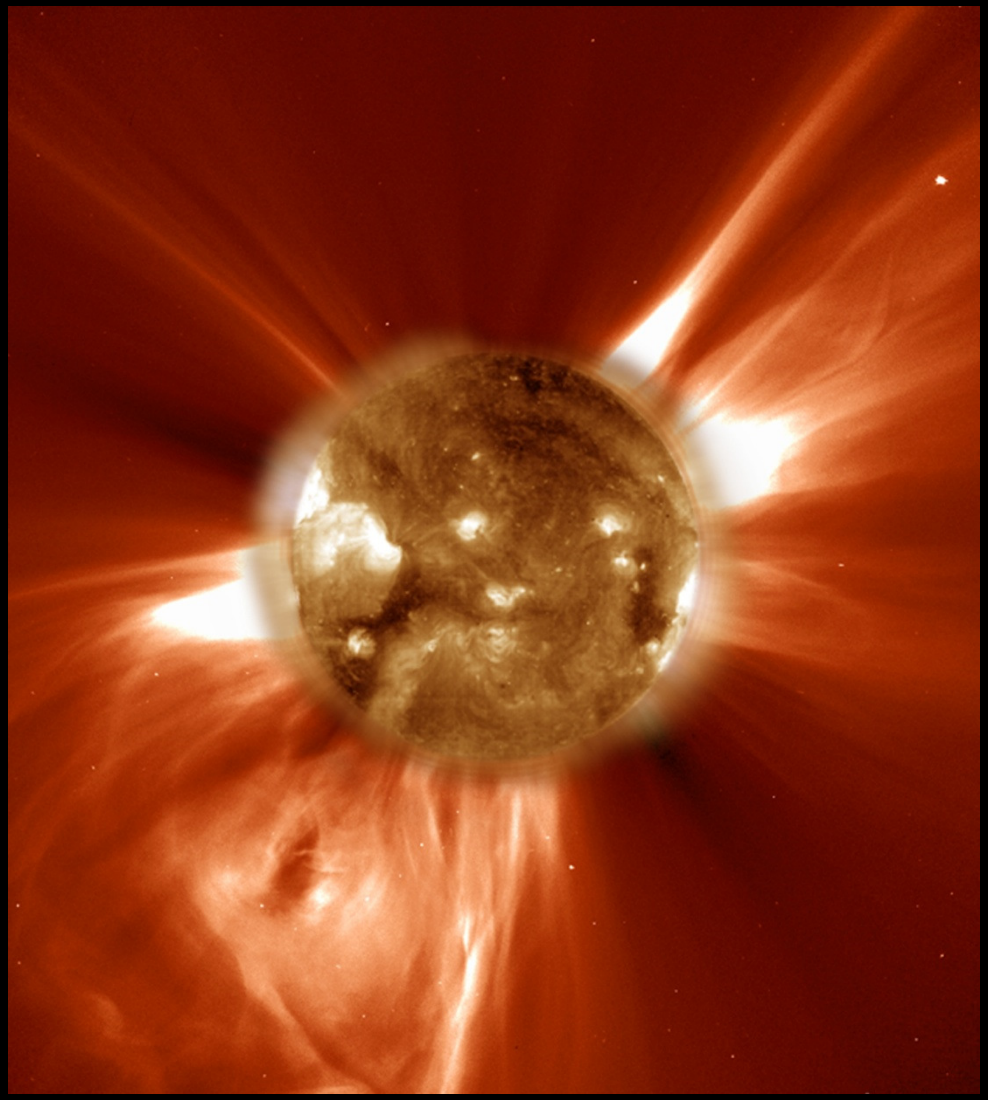
NIKE

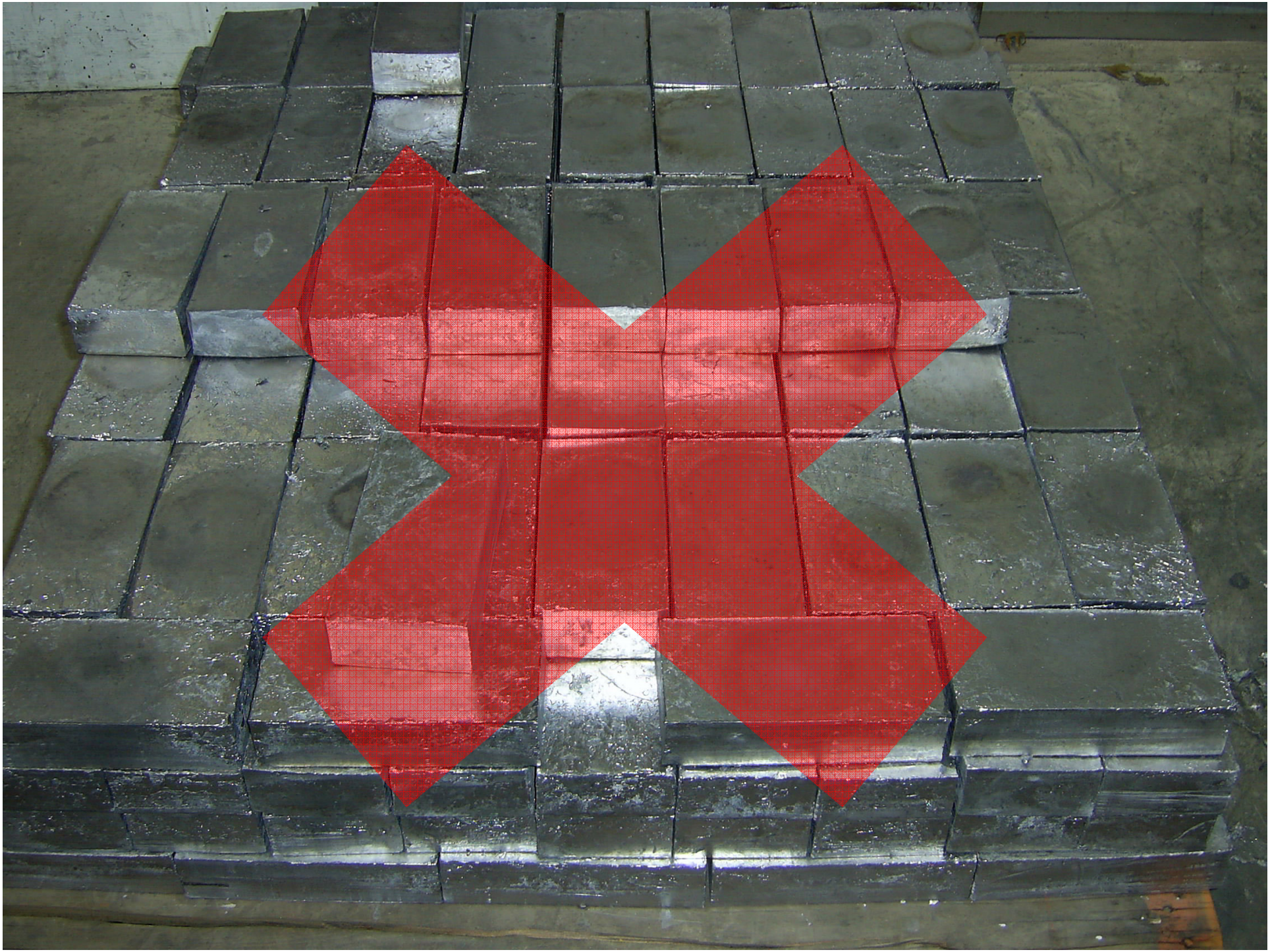


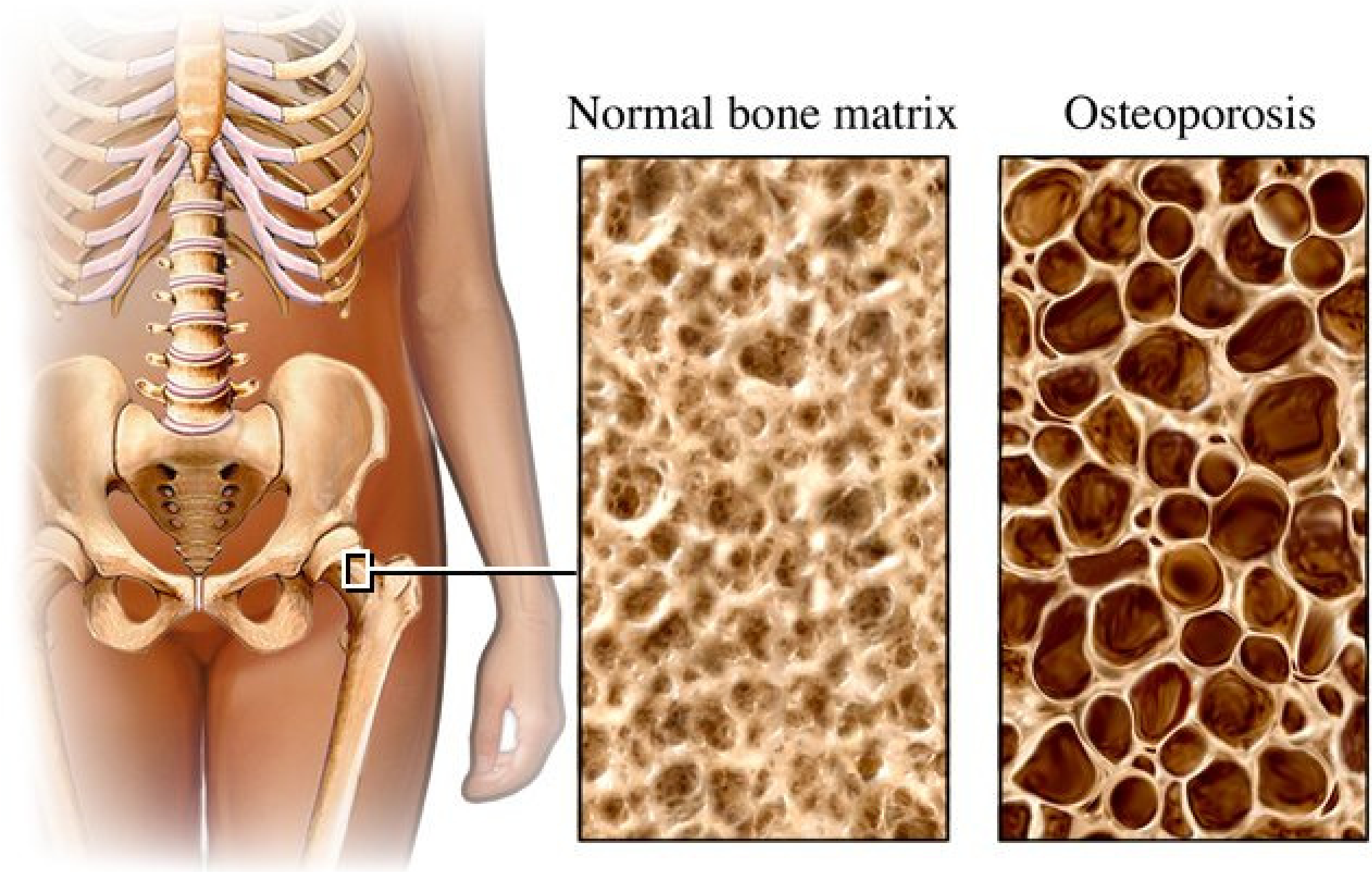
HEARING

GROSS ANATOMY OF THE EAR—FRONTAL SECTION







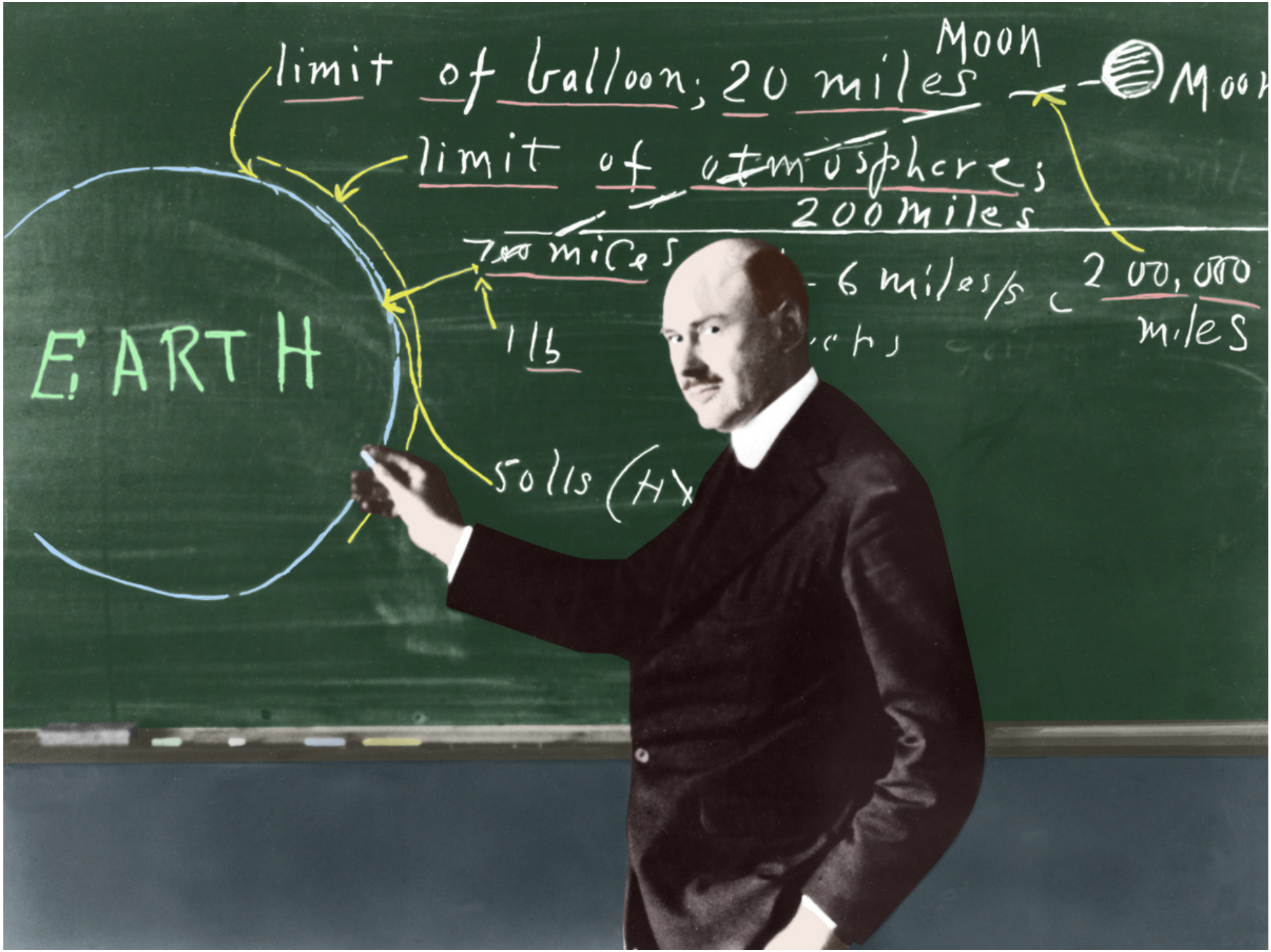
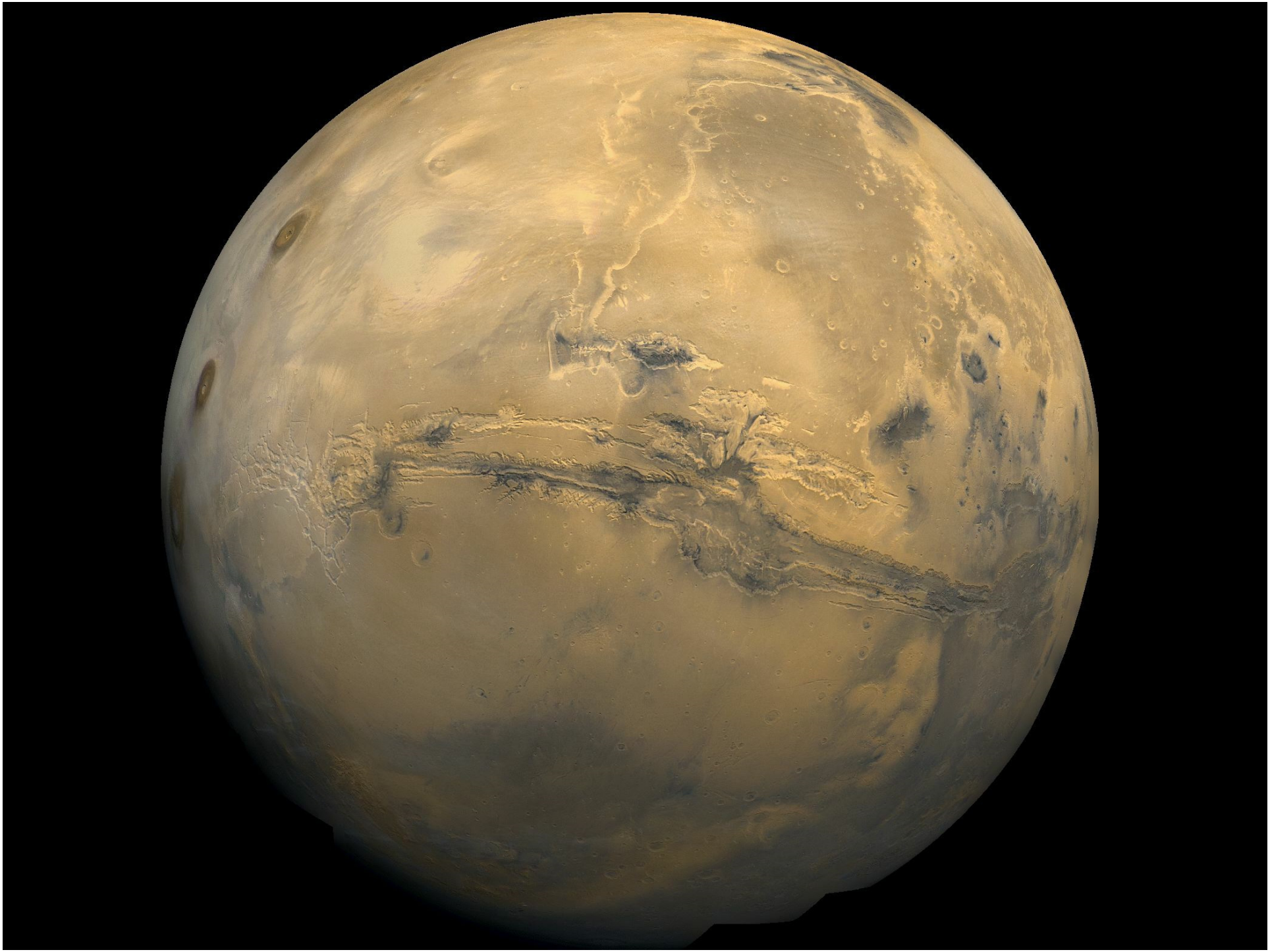

Normal bone matrix
Osteoporosis

22P
23P
O24-22P

?

?

?!


limit of balloon; 20 miles
Moon
limit of atmosphere;
200 miles
6 miles/s
200,000
miles
1 lb
EARTH