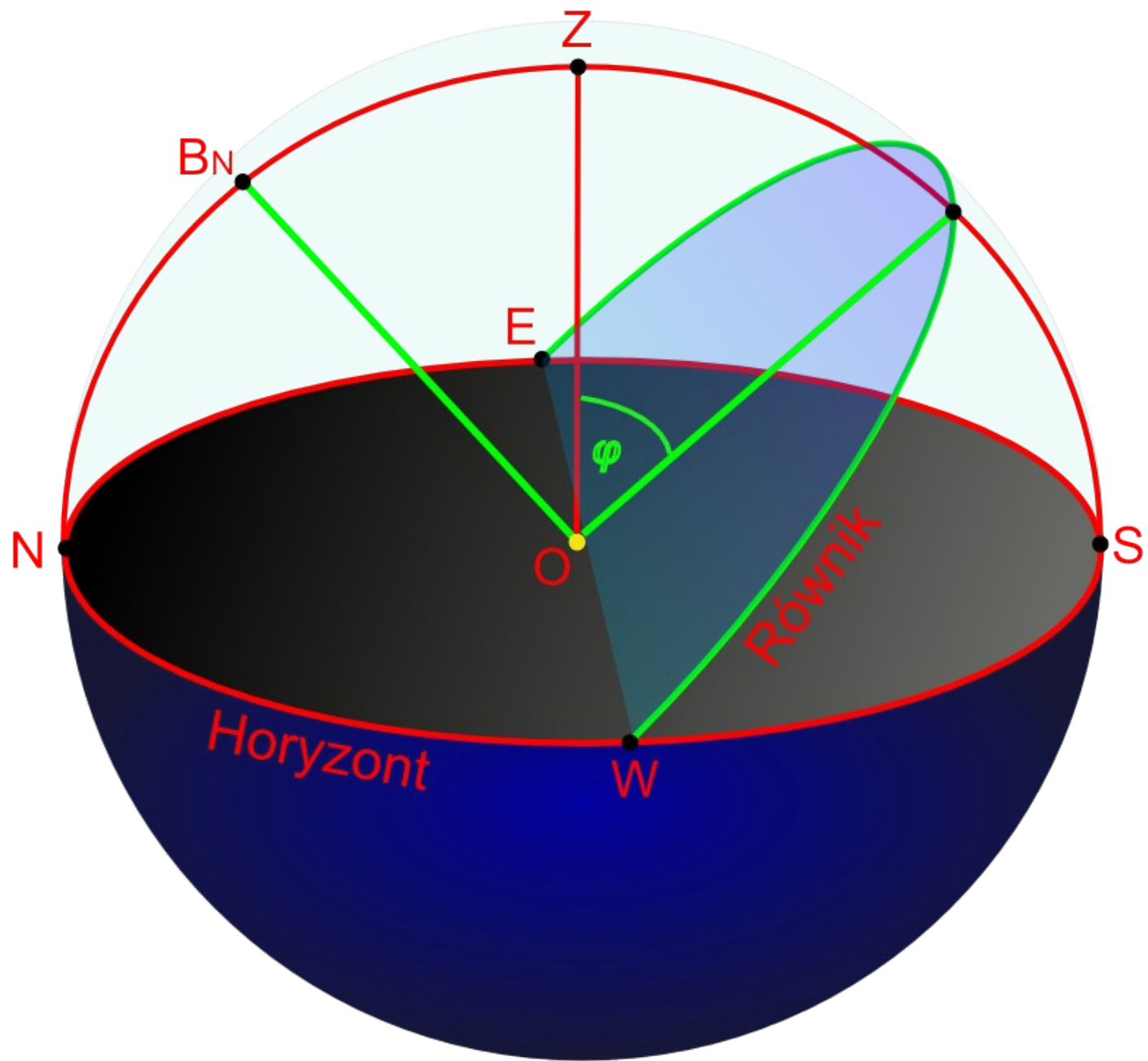


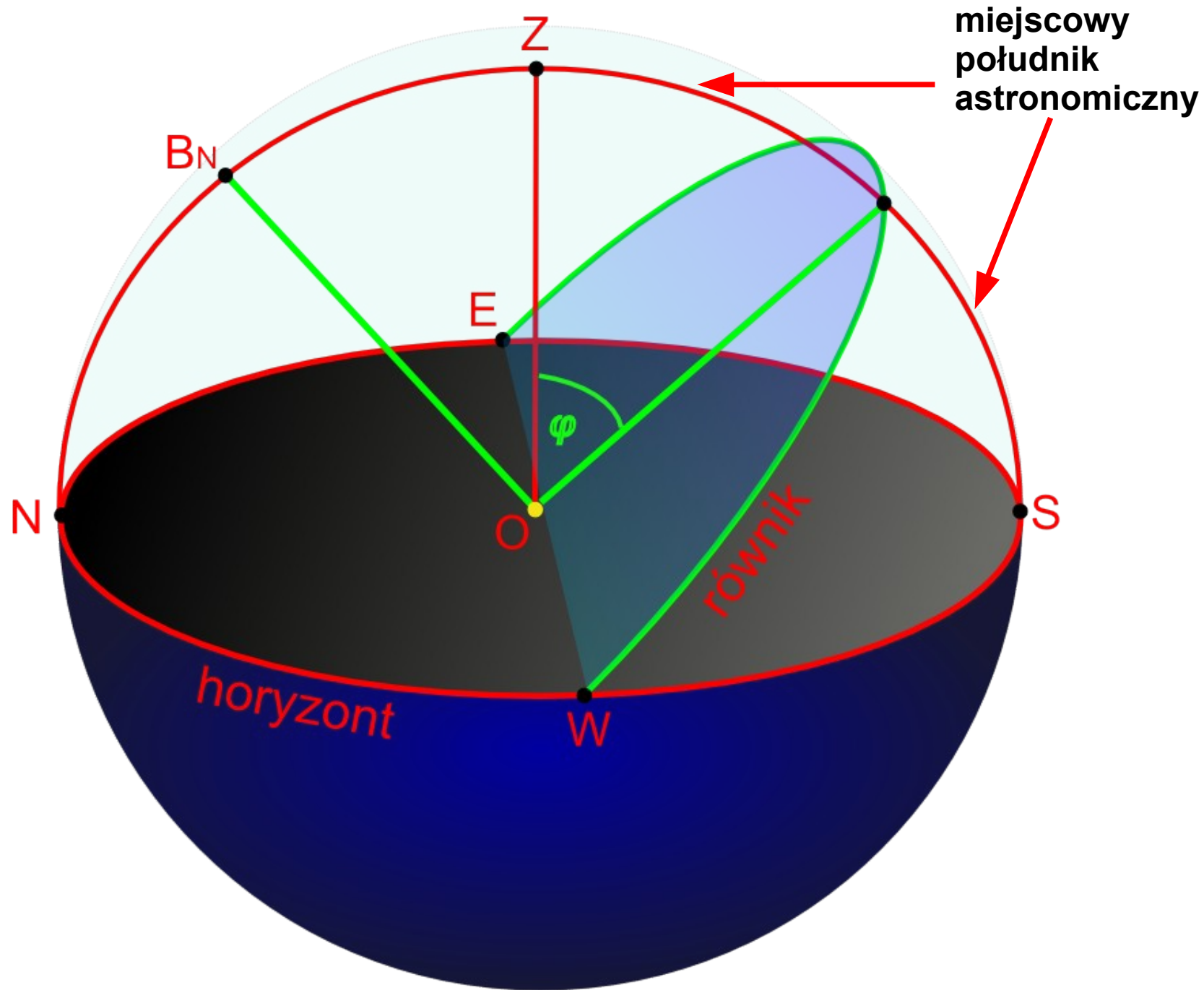
Wykład udostępniam na licencji Creative Commons:



Układy sferycznych współrzędnych astronomicznych

Piotr A. Dybczyński





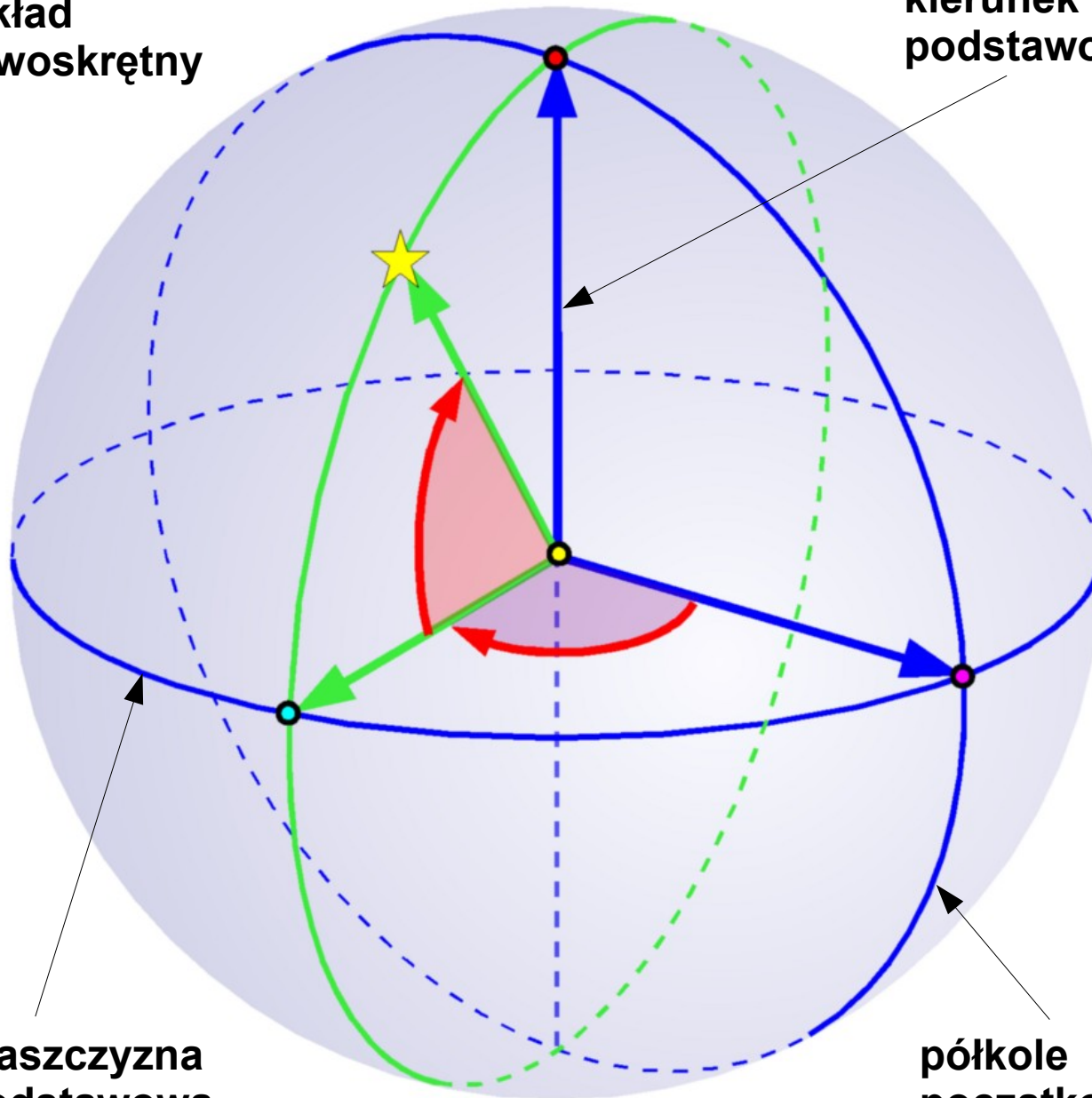
Współrzędne sferyczne

Układ
lewoskrętny

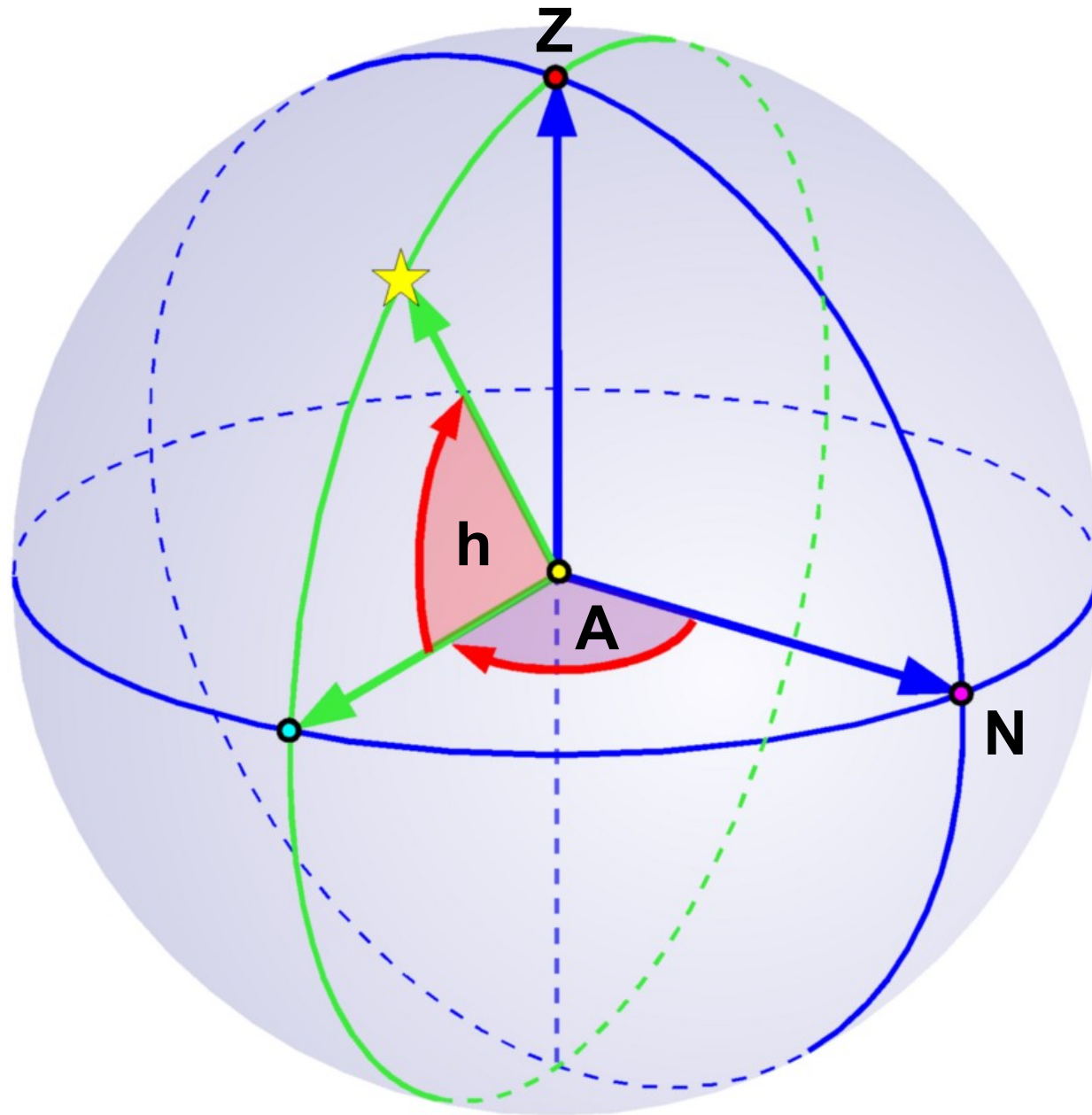
kierunek
podstawowy

płaszczyzna
podstawowa

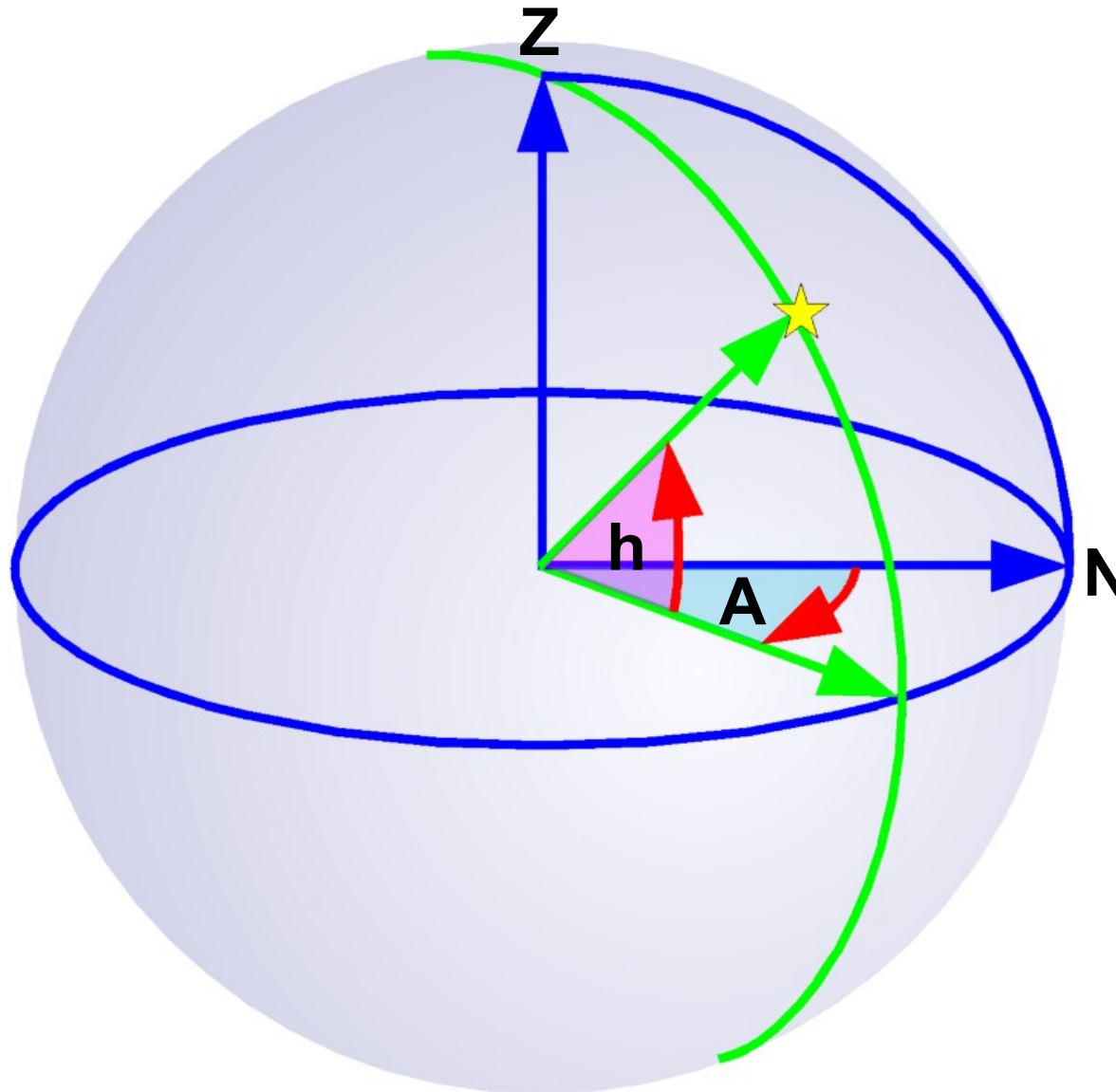
półkole
początkowe



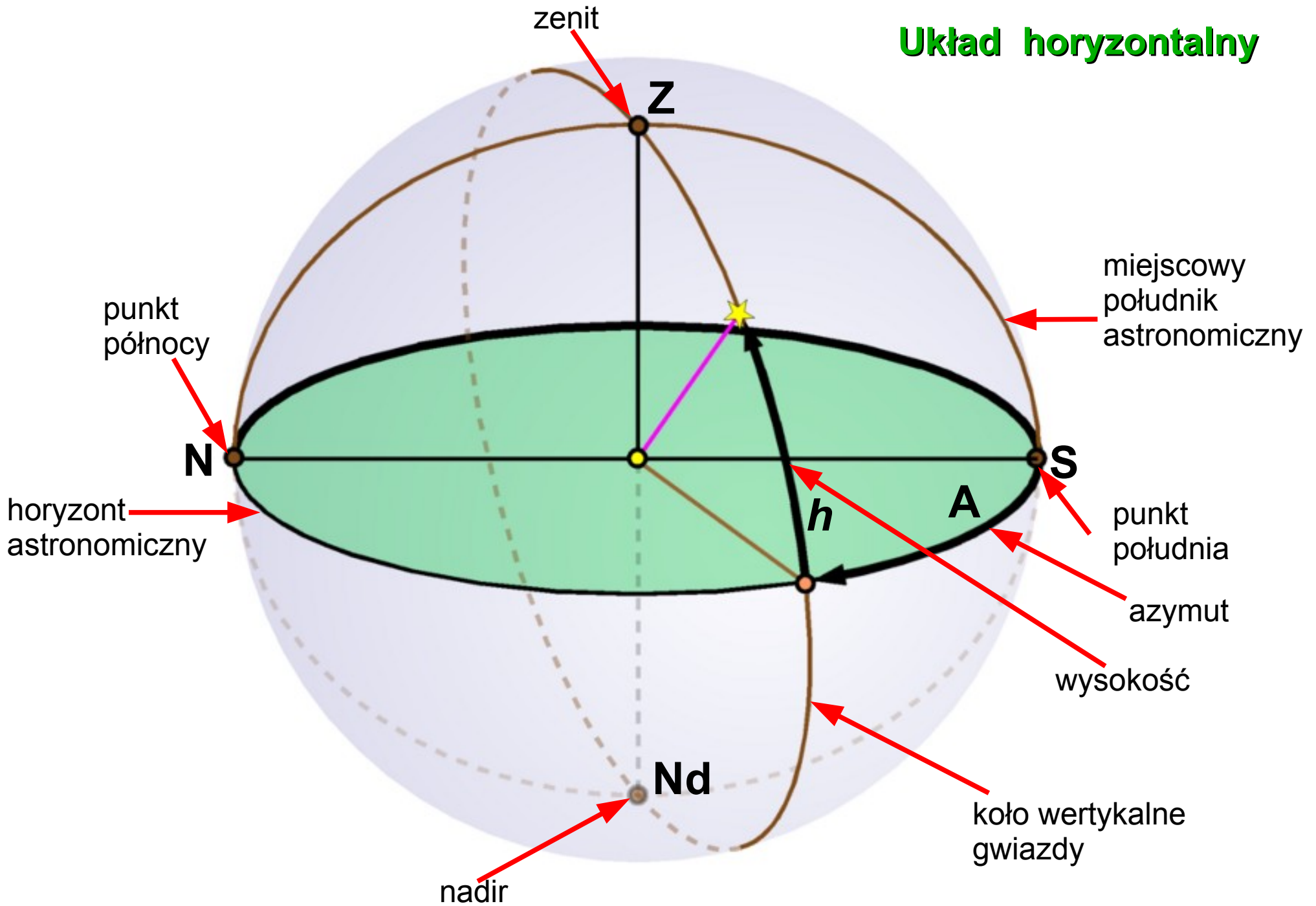
Układ horyzontalny



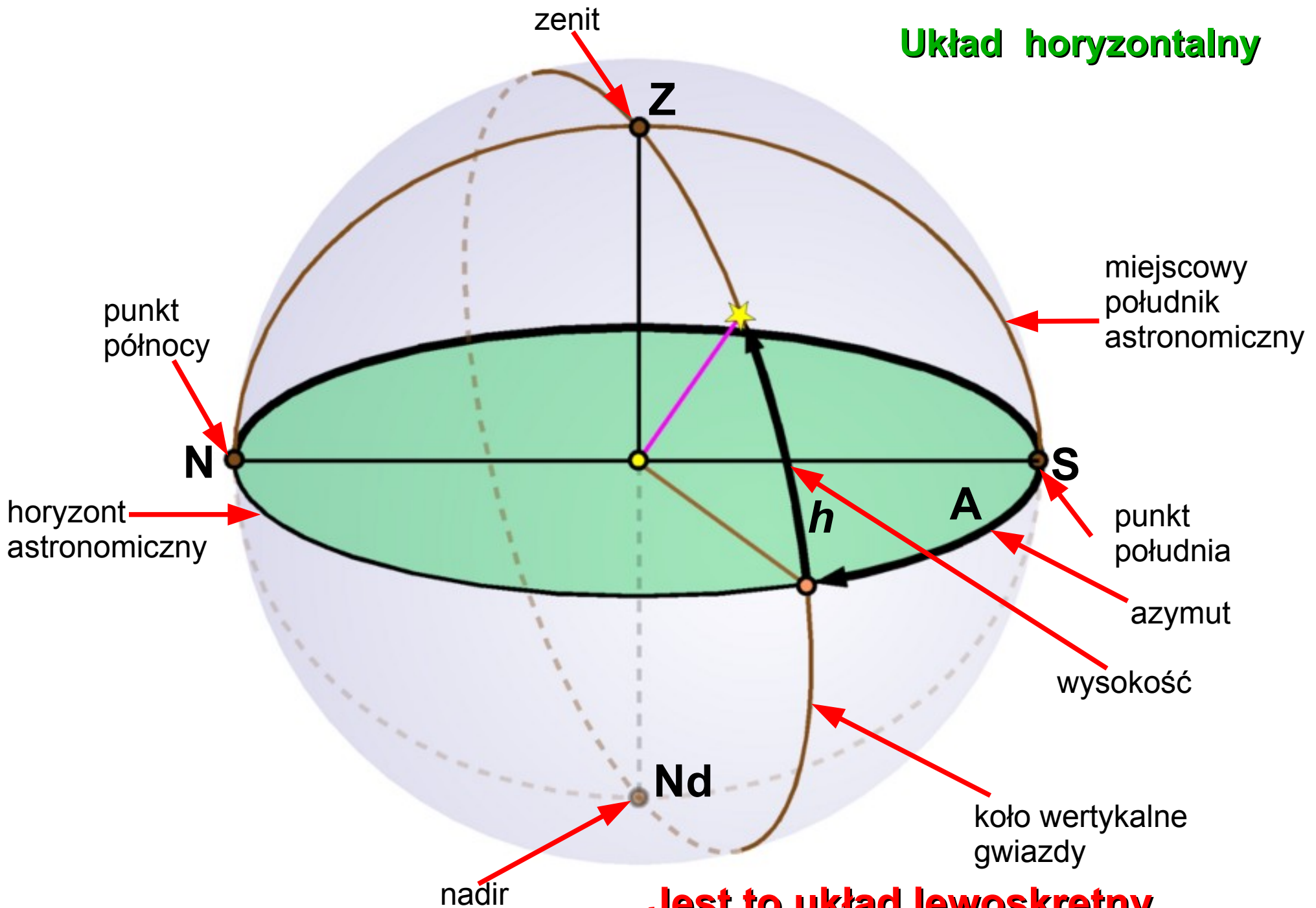
Układ horyzontalny



Układ horyzontalny

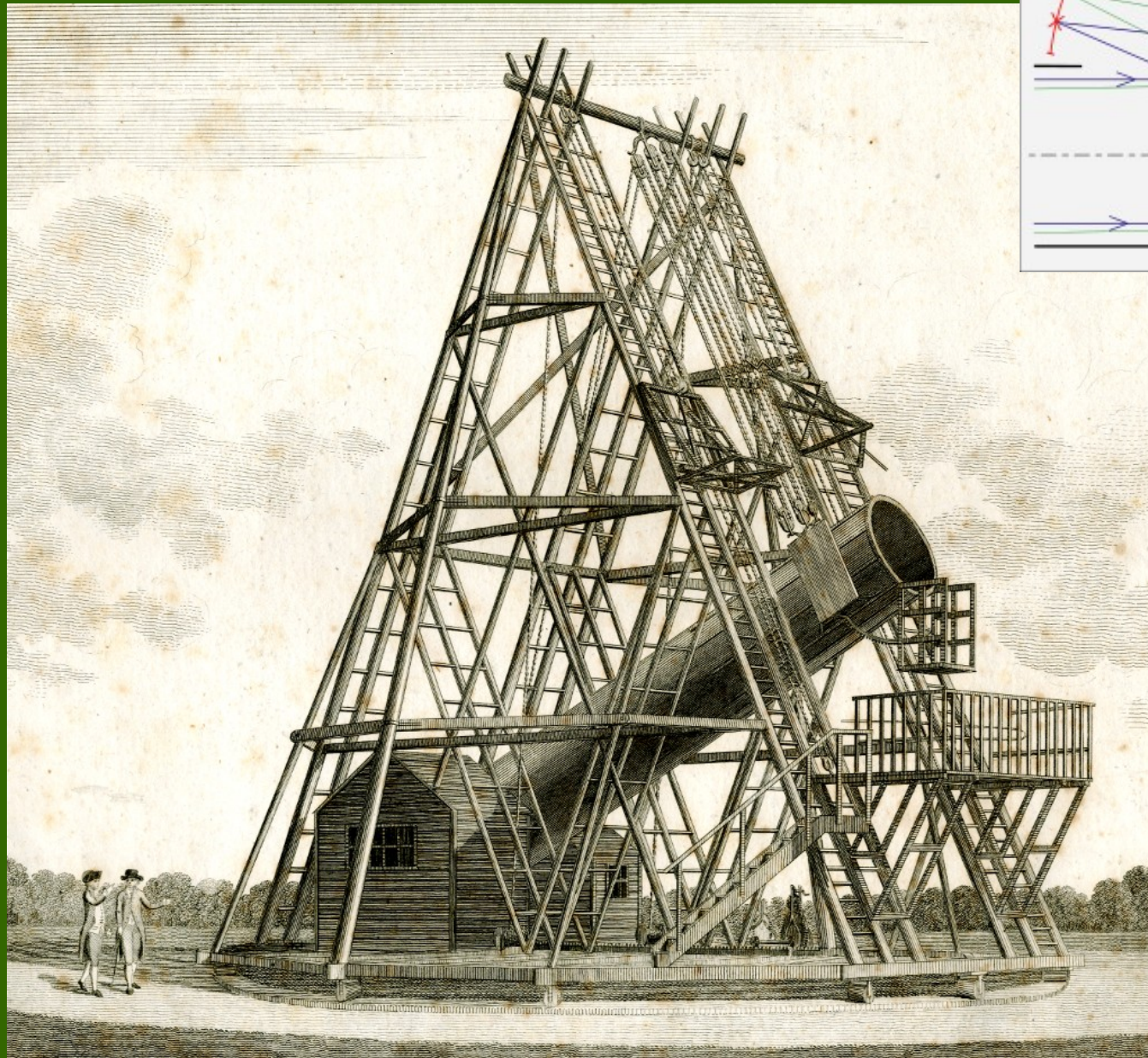


Układ horyzontalny



**Teleskopy na montażu
horyzontalnym
(azymutalnym).**

40-stopowy teleskop Williama Hershella



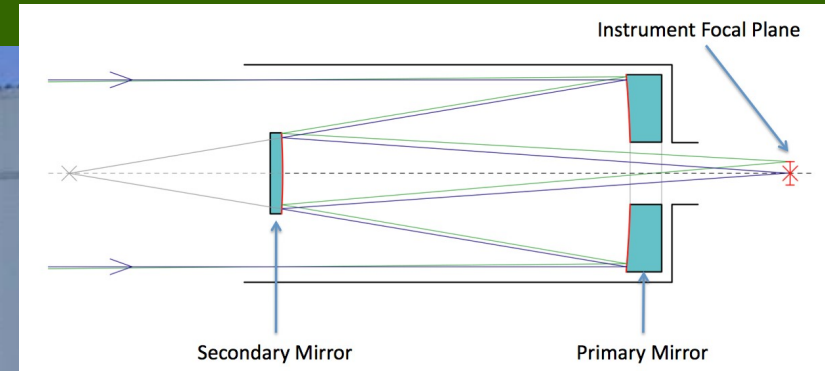
Rys: Eudjinnius

Zbudowany w latach 1785-1789, ogniskowa 40 stóp (12m), zwierciadło o średnicy 48 cali (120cm).

W pełni obrotowy montaż azymutalny.

Przez 50 lat był największym teleskopem Na świecie.

Teleskop MMT na Mt Hopkins w Arizonie



Średnica 6.5 m
Ogniskowa 9.6.

Zbudowany
w roku 1979
jako „multiple
Mirror” - miał
sześć niezależ-
nych luster .

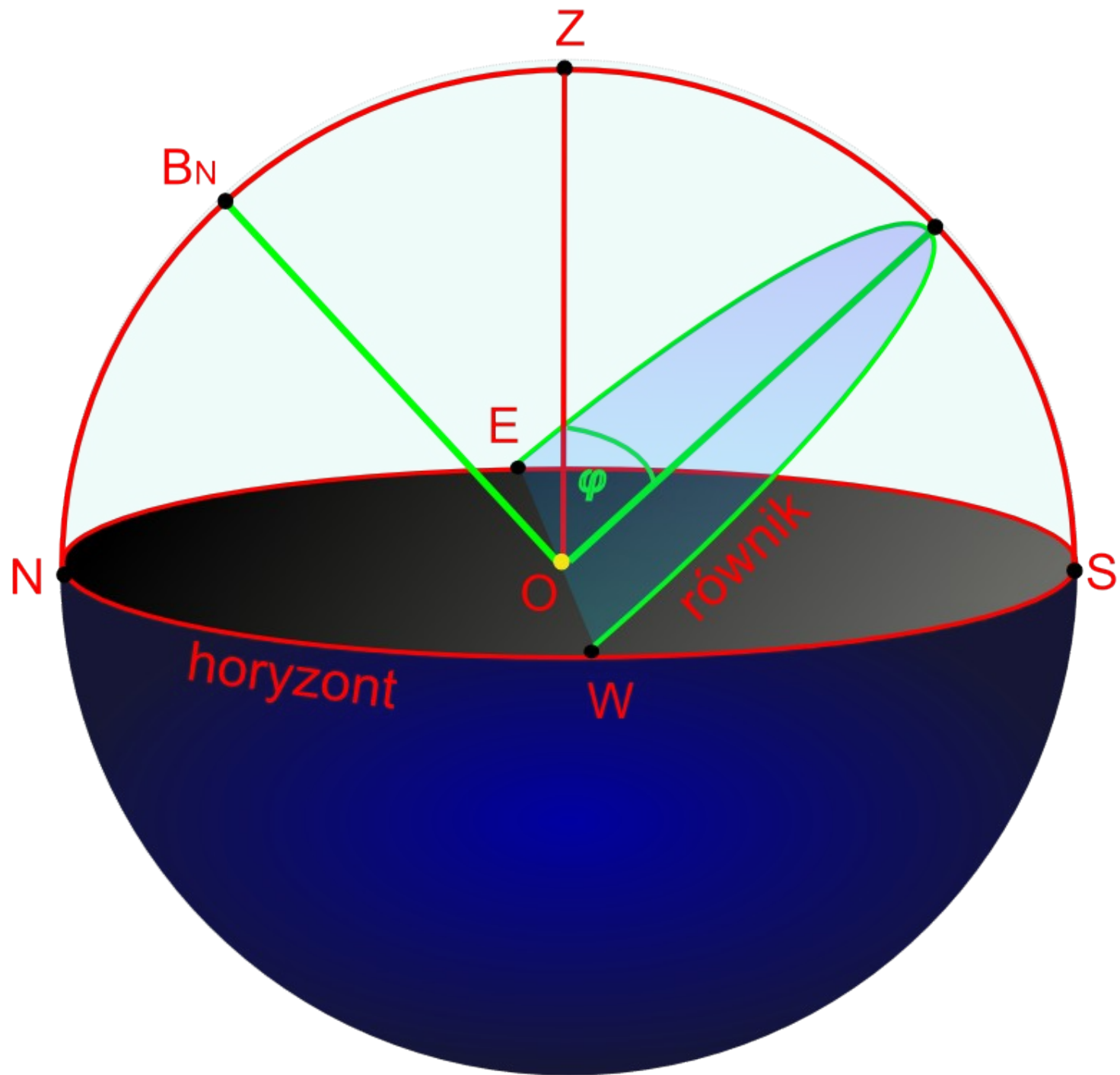
Uruchomiony
z nowym
lustrem
w roku 2000.

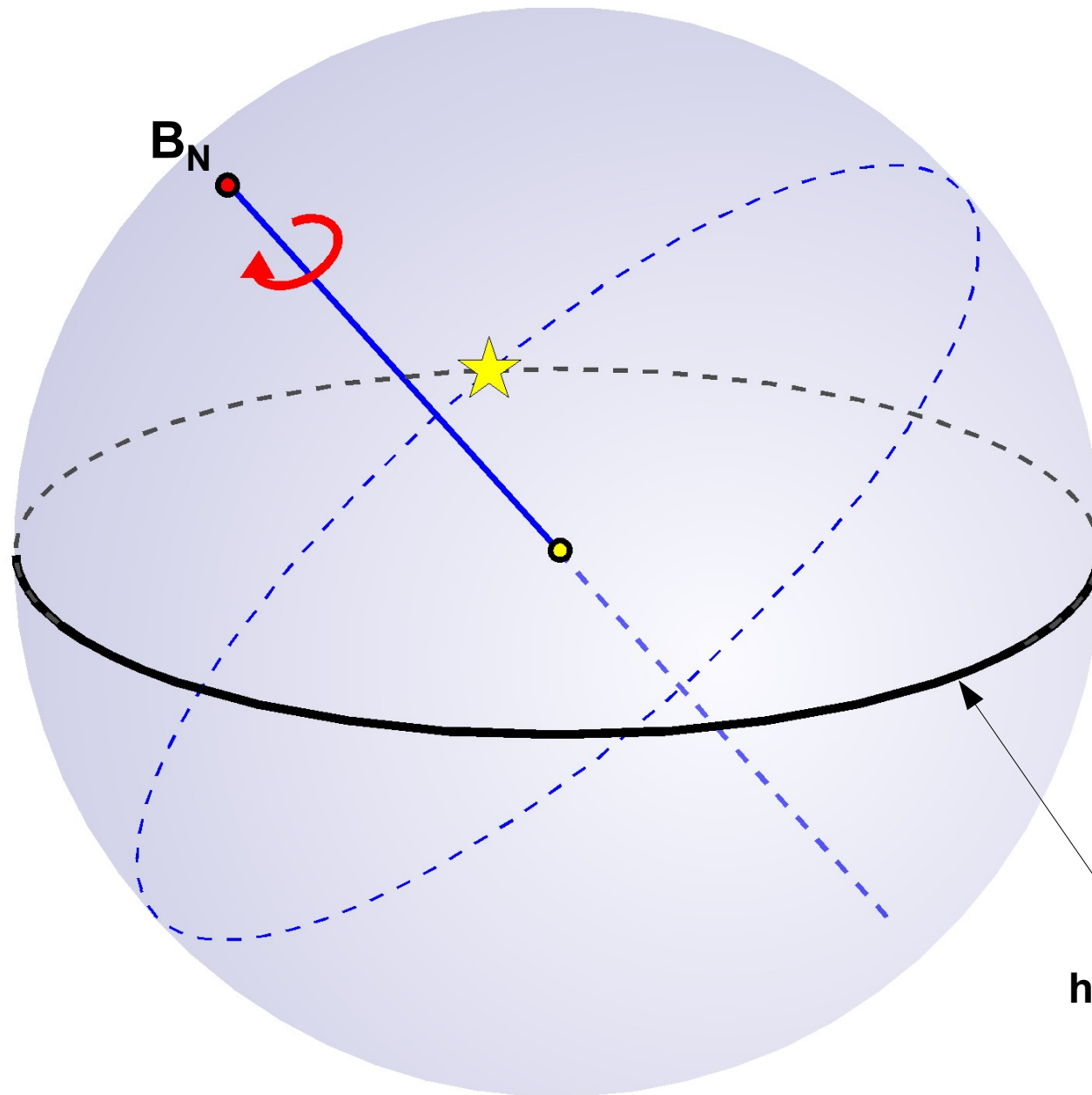
Teleskop BTA 6 na Kaukazie w Rosji



Fot. Boris V., Facebook

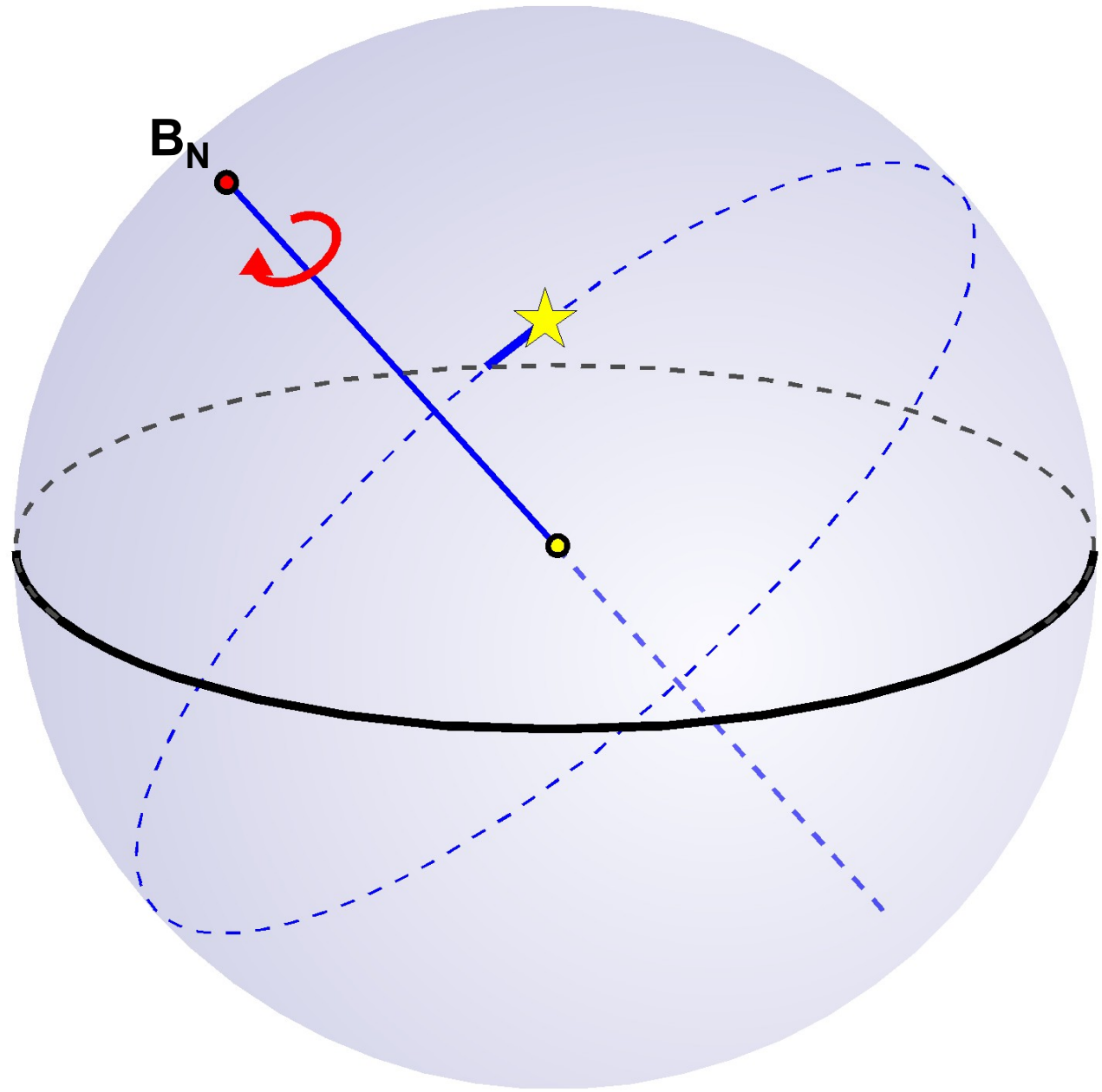
W pełni operacyjny od 1977. Średnica 6m, ogniskowa 24m.

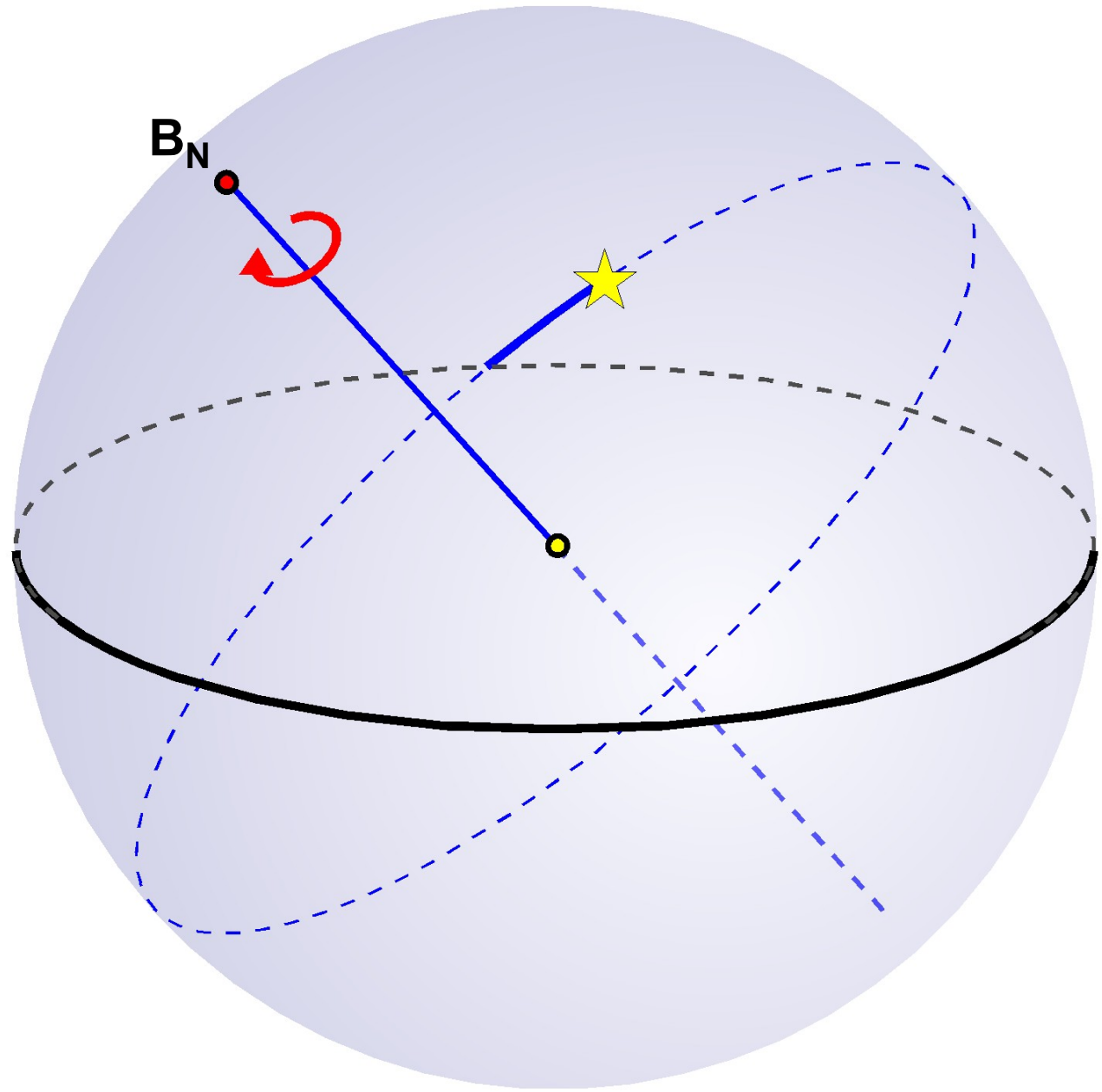


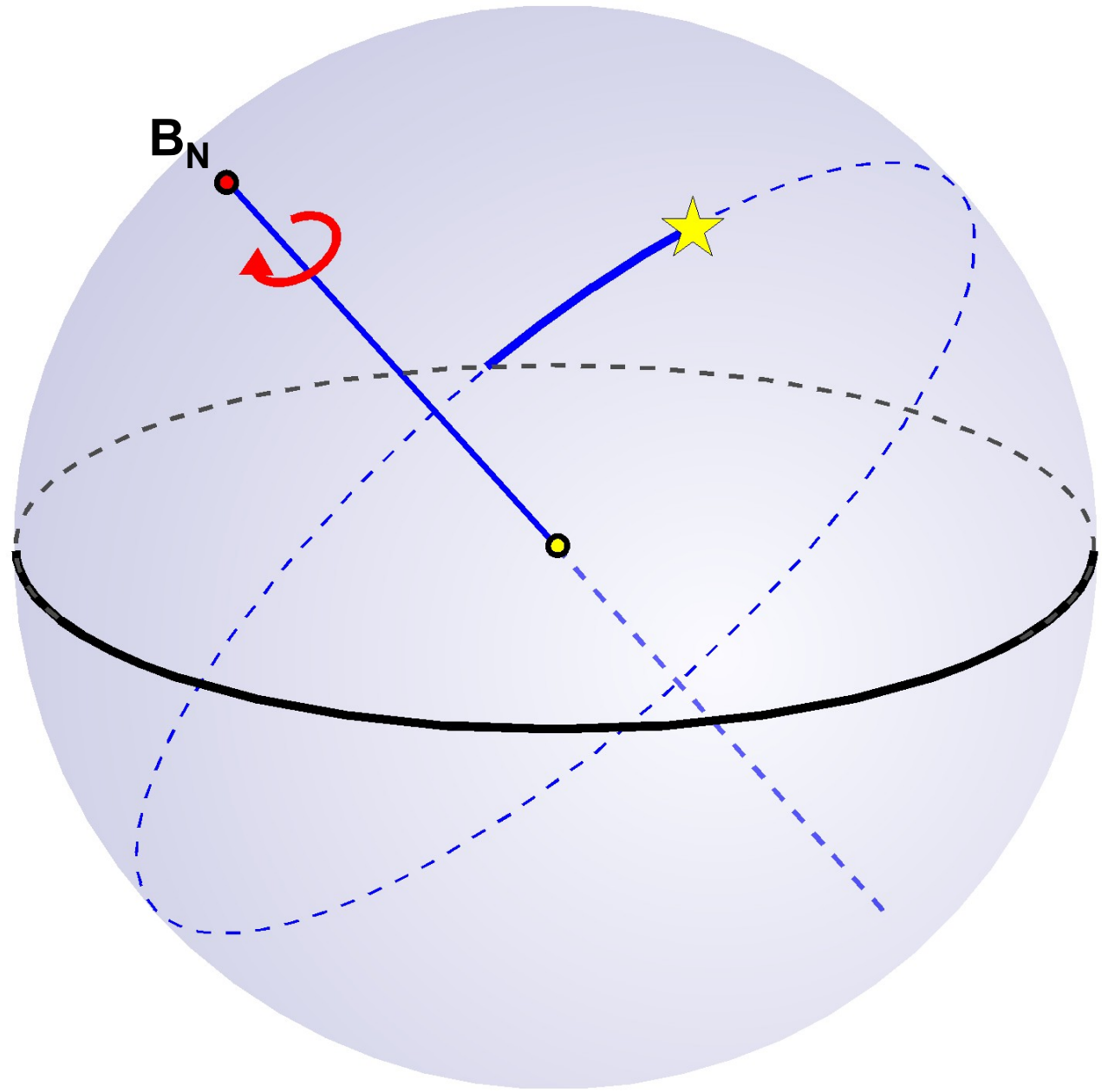


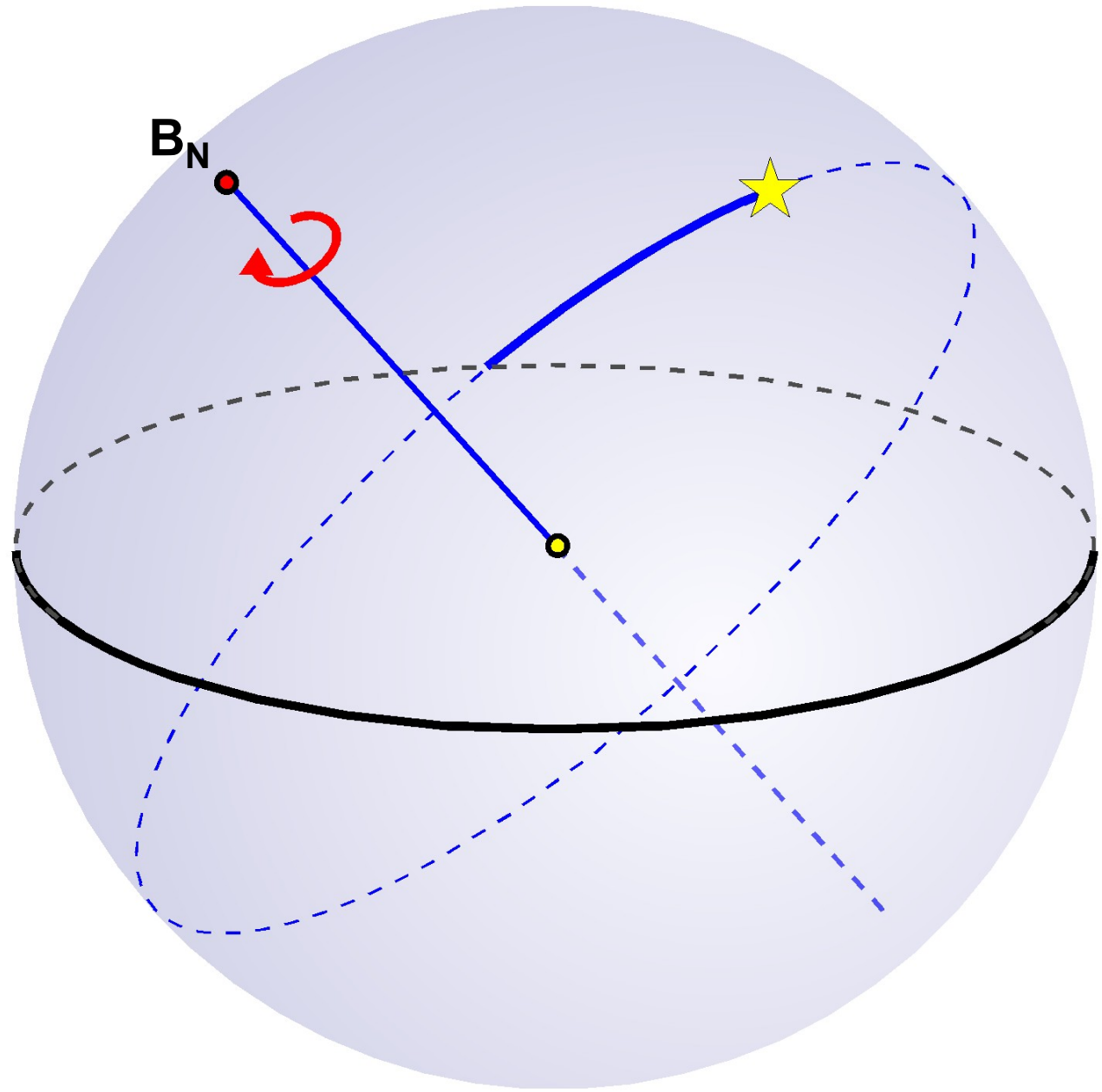
Wschód

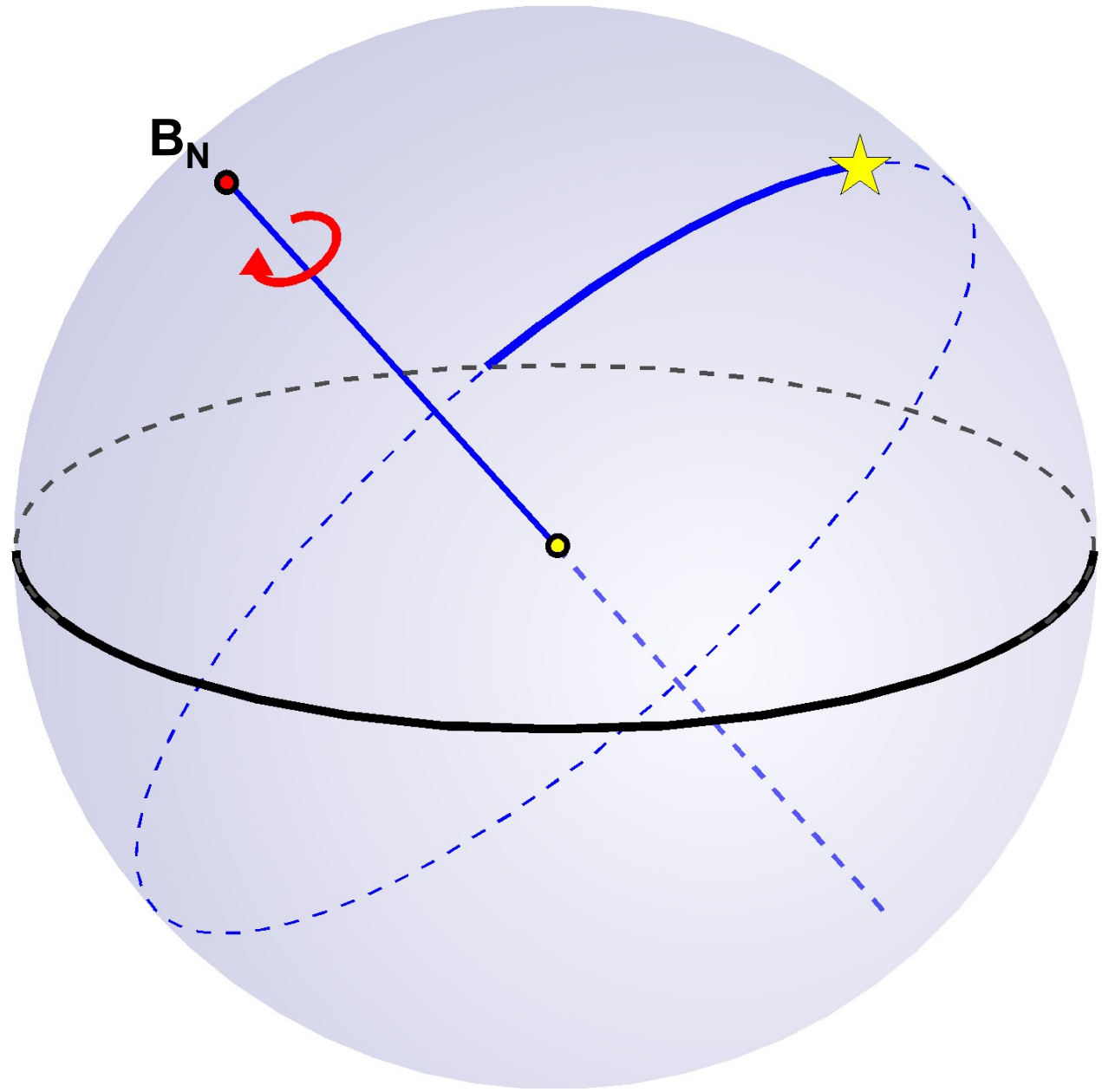
horyzont

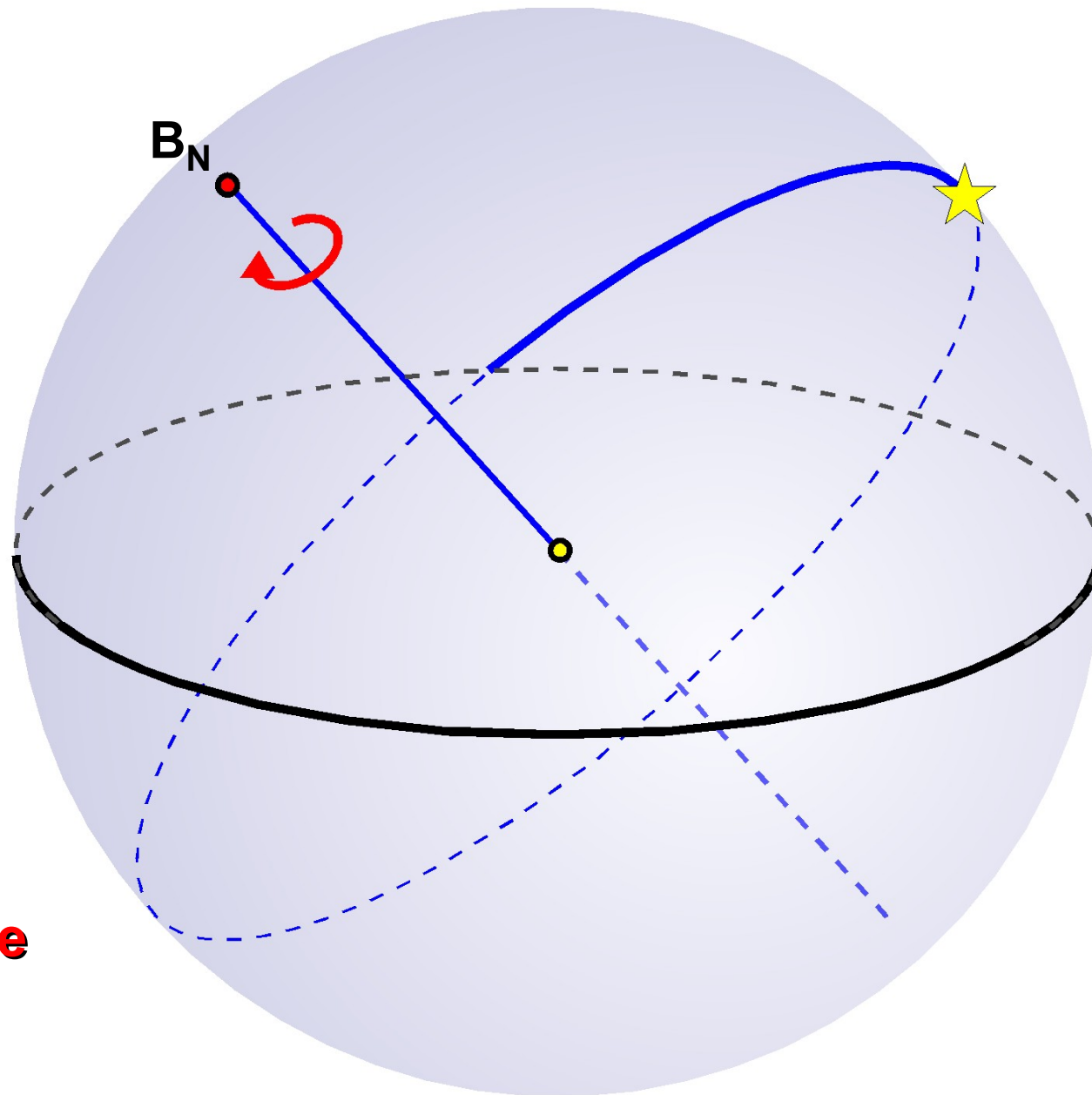




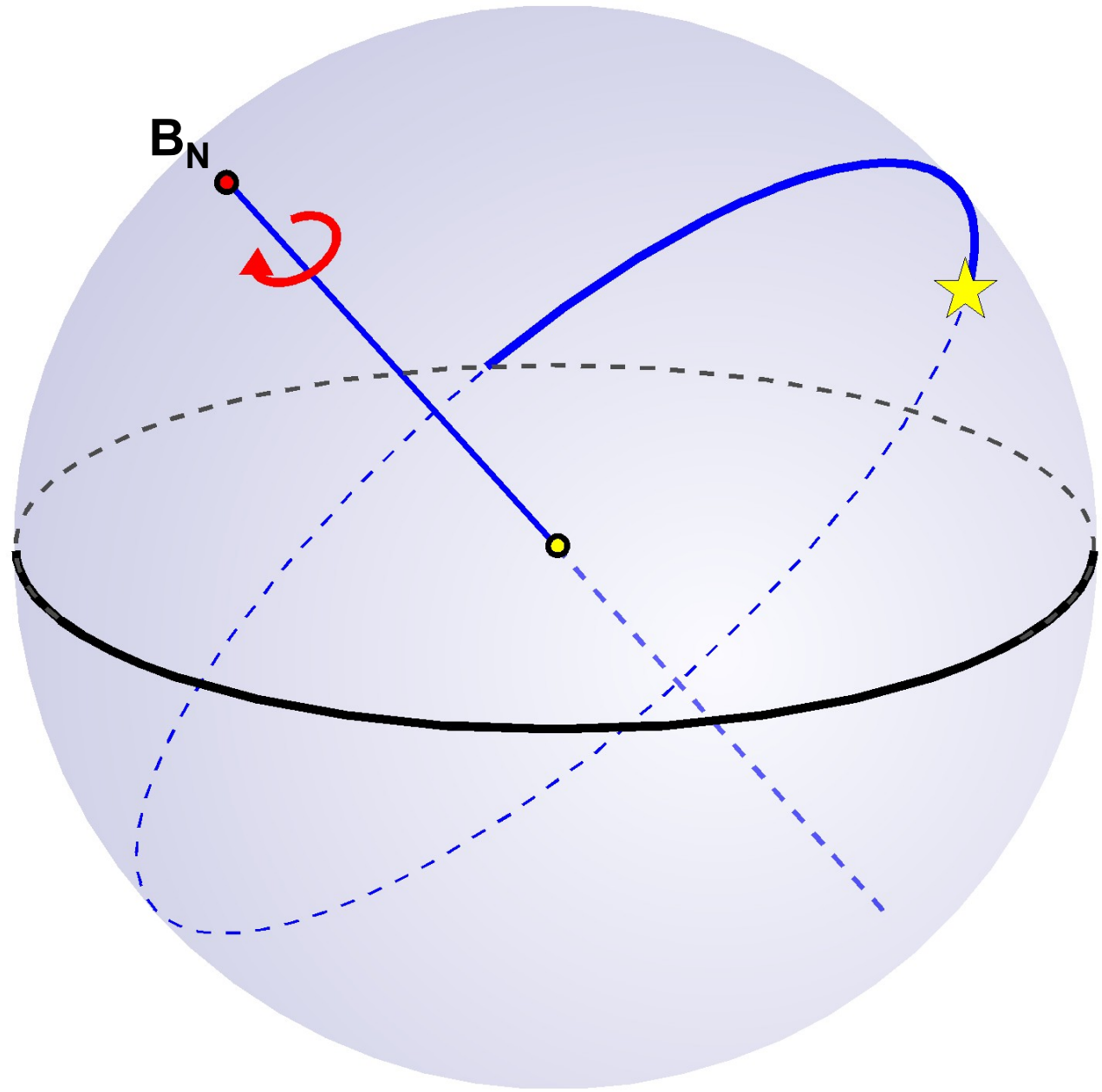


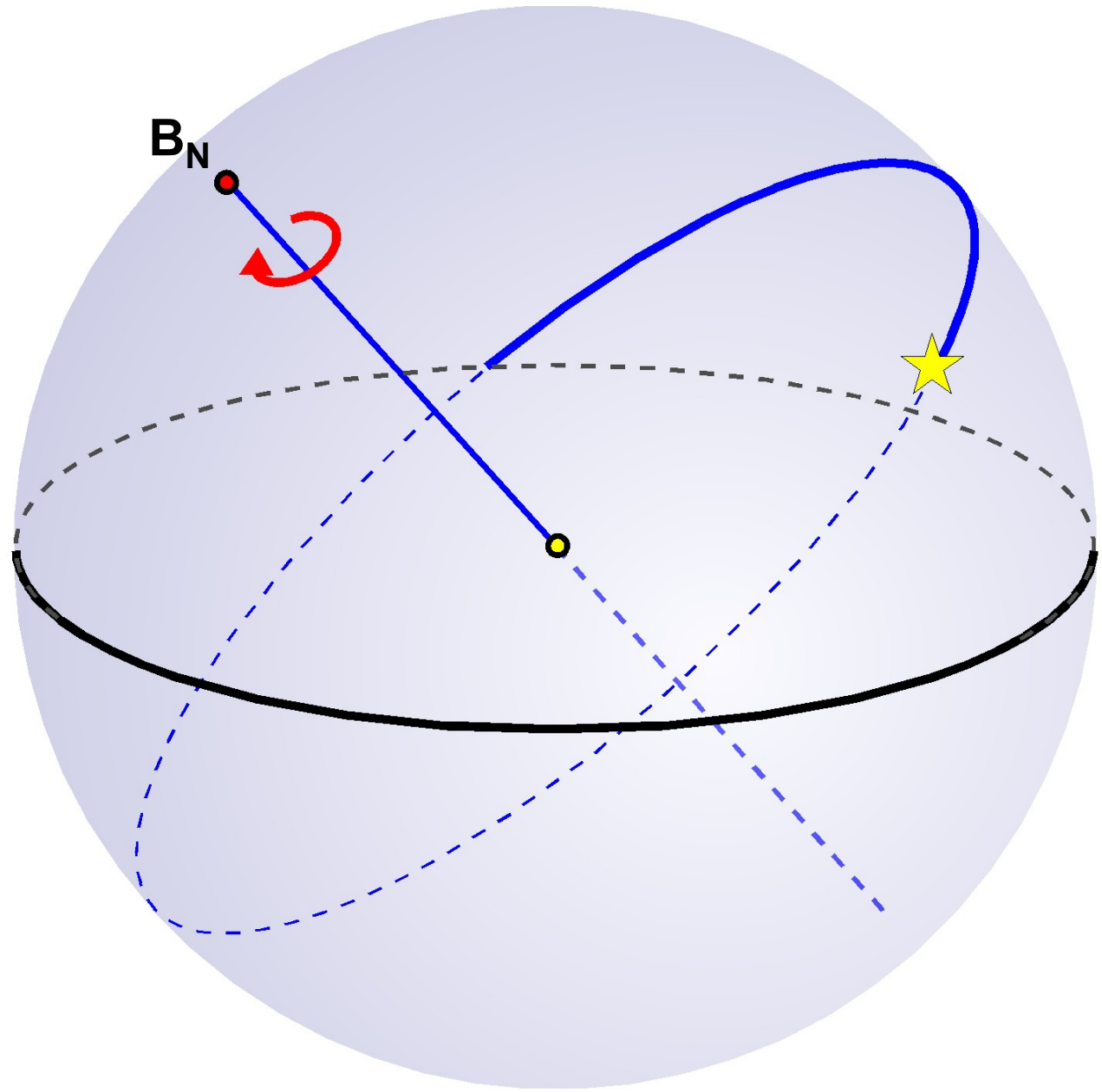


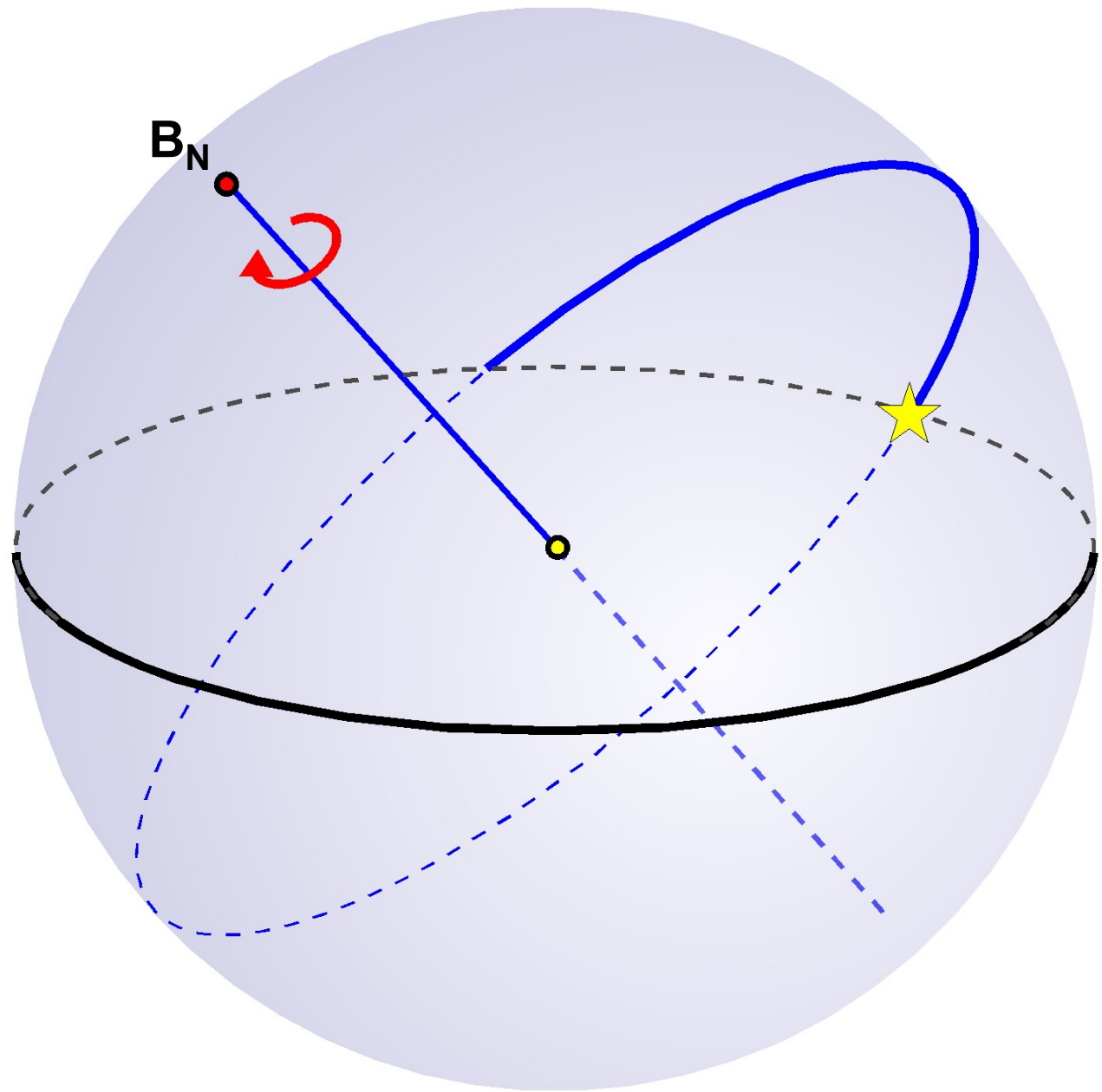


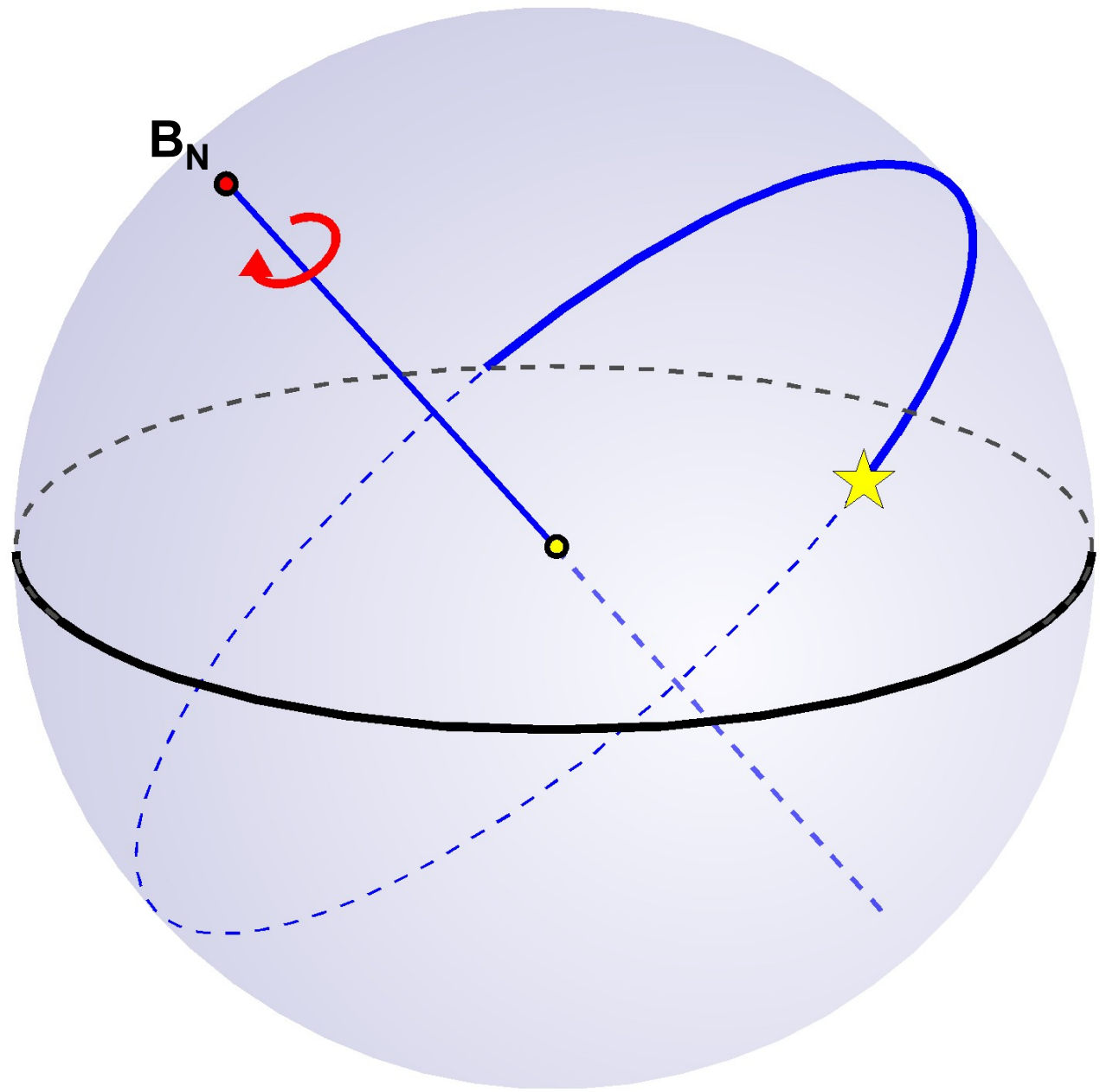


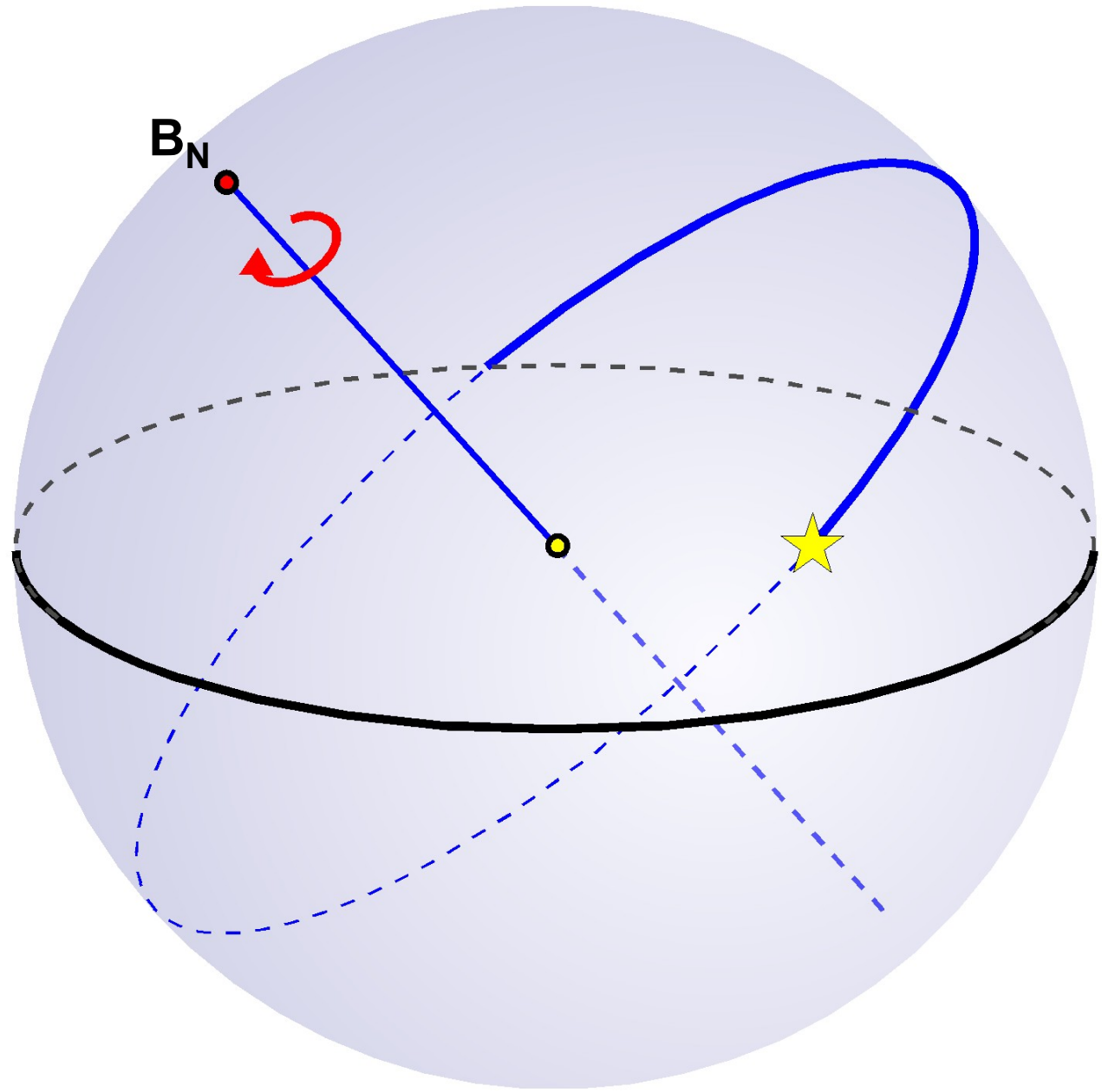
Górowanie

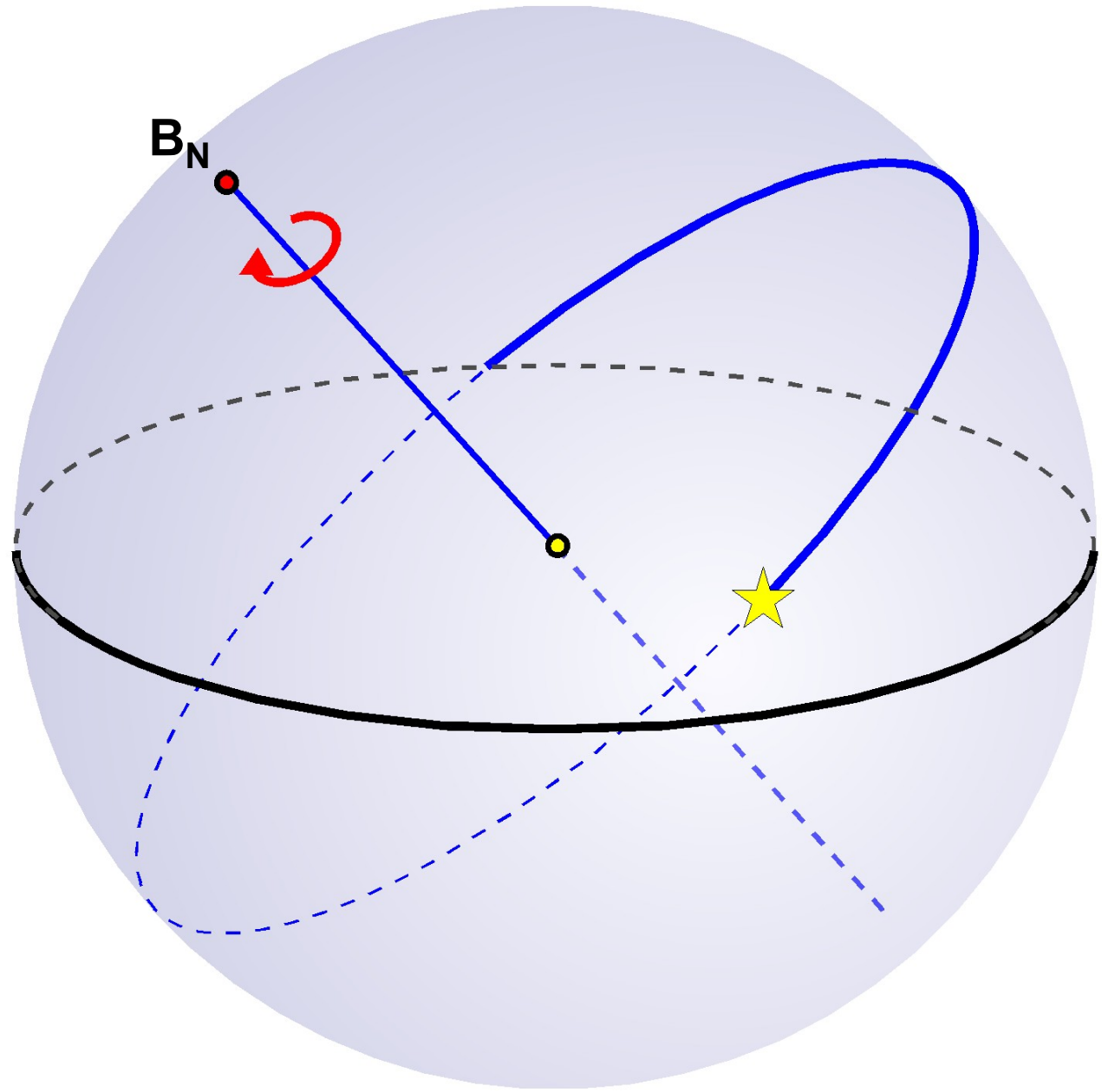


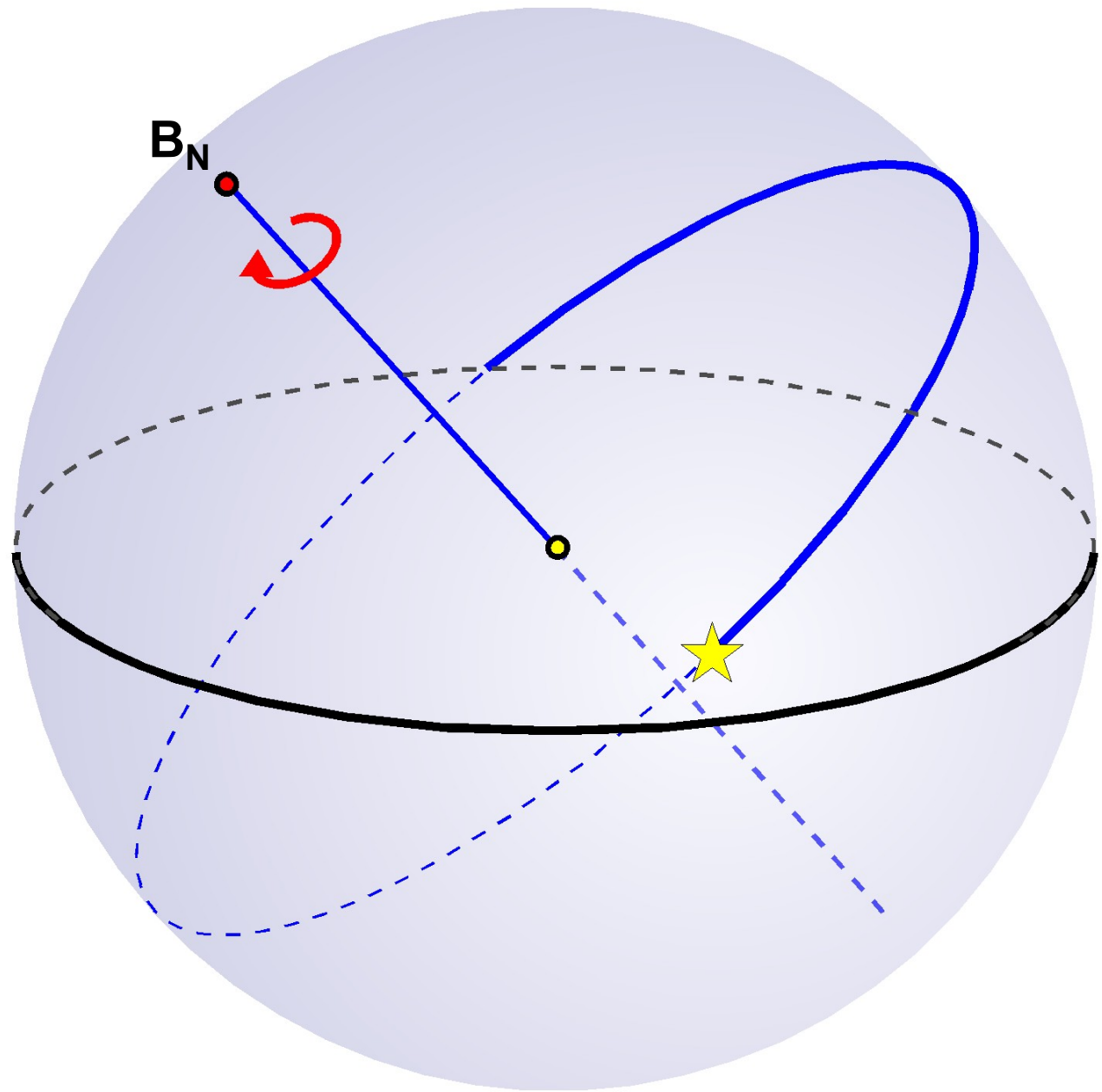


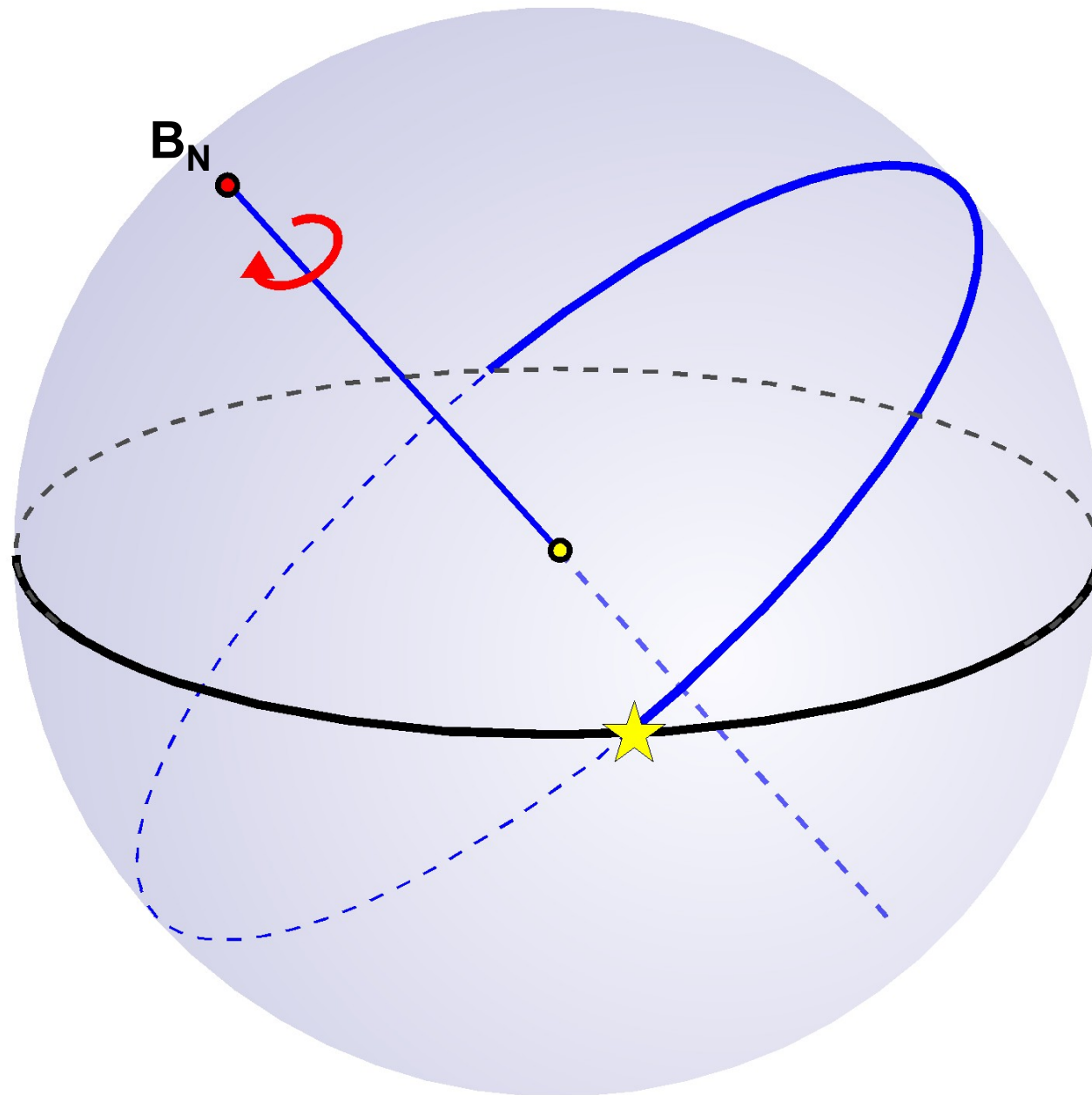




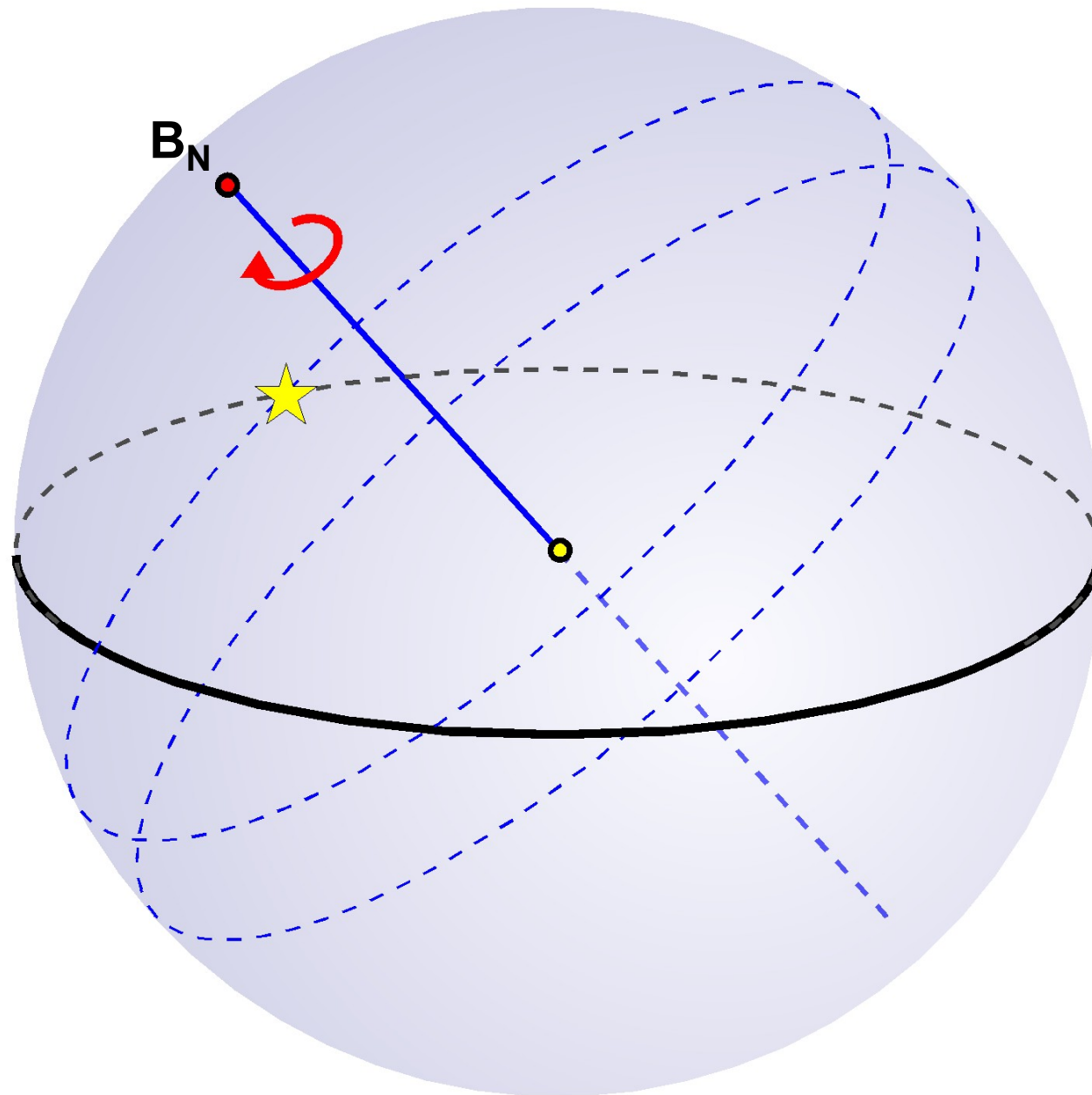




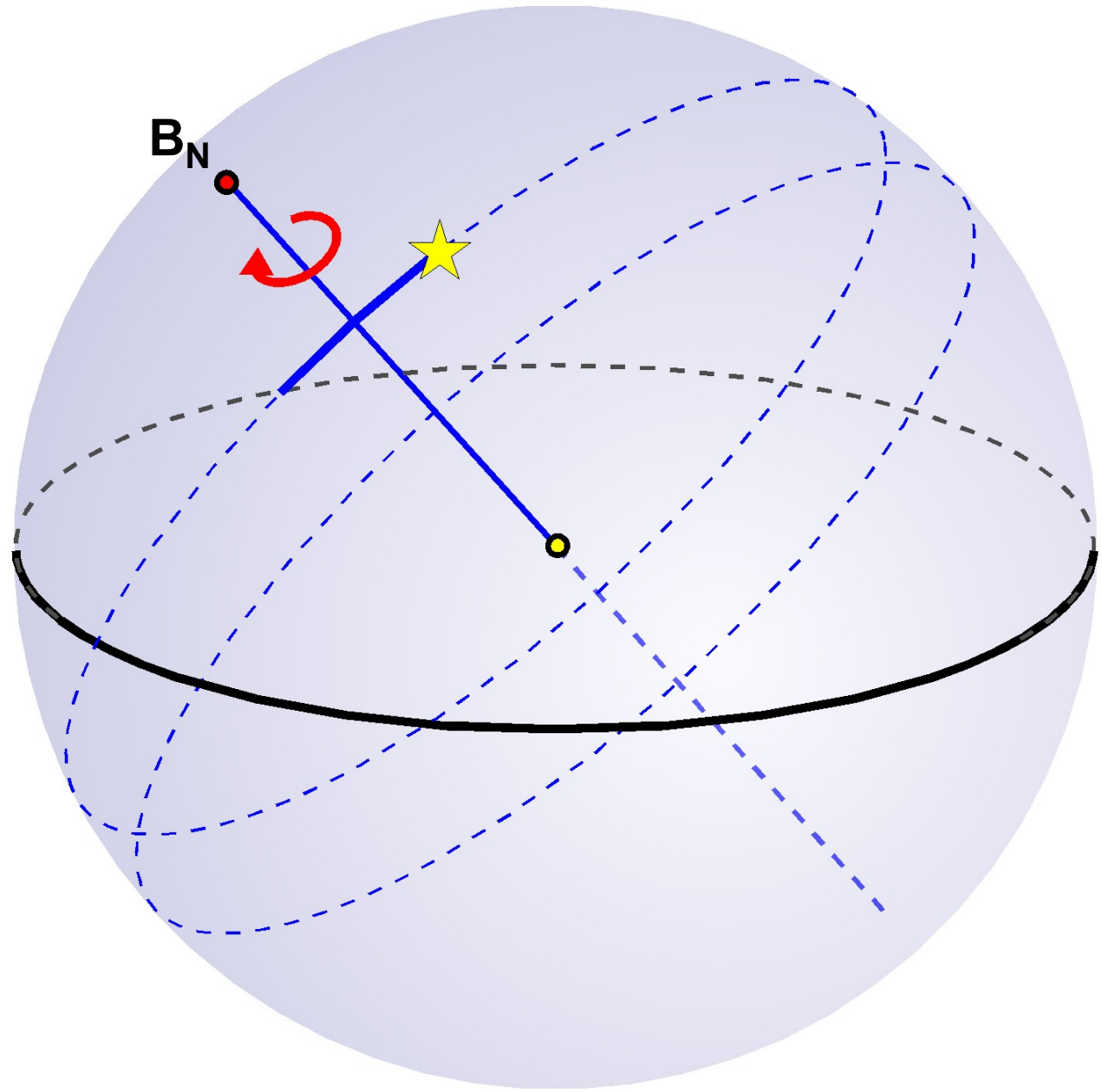


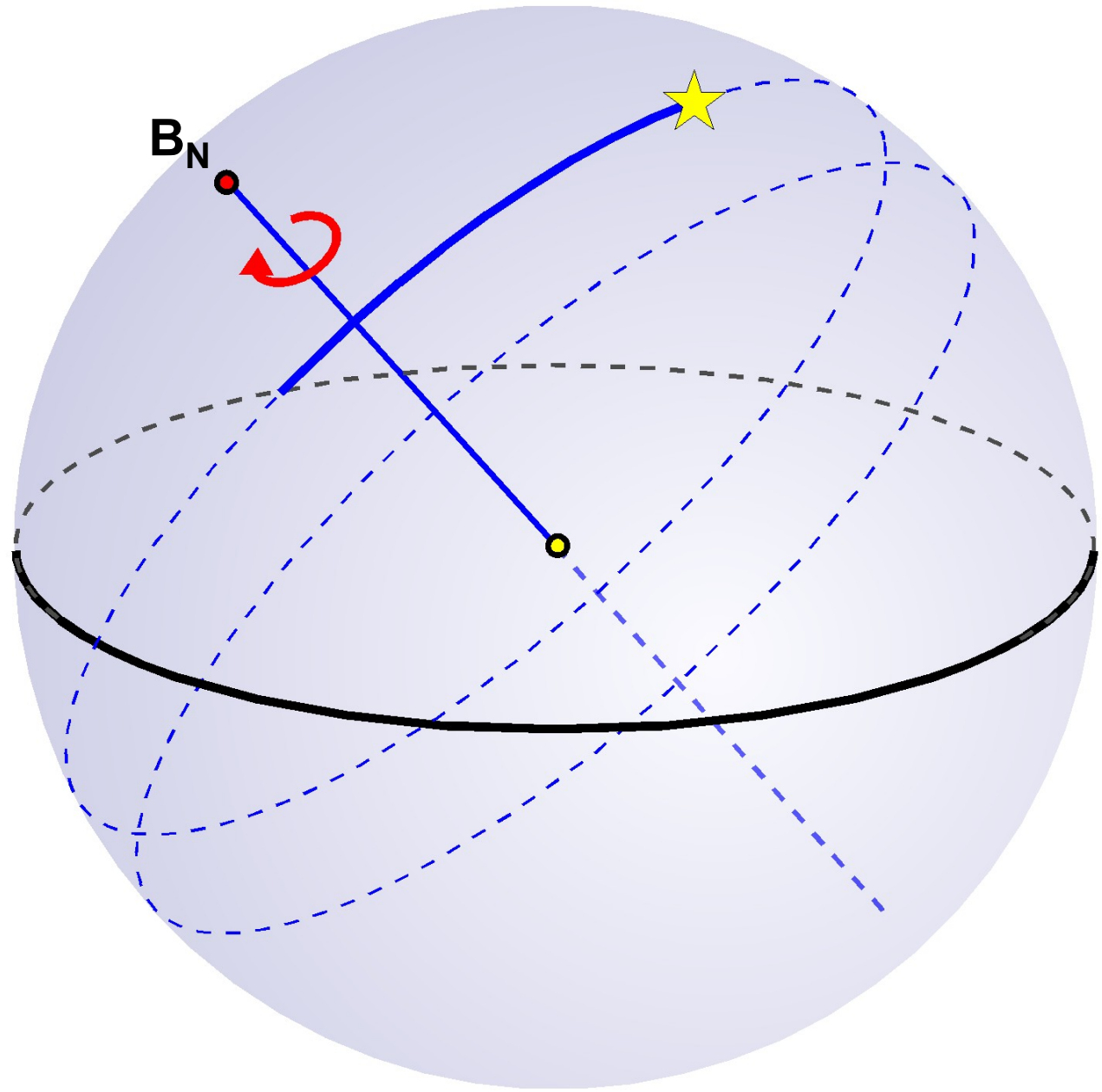


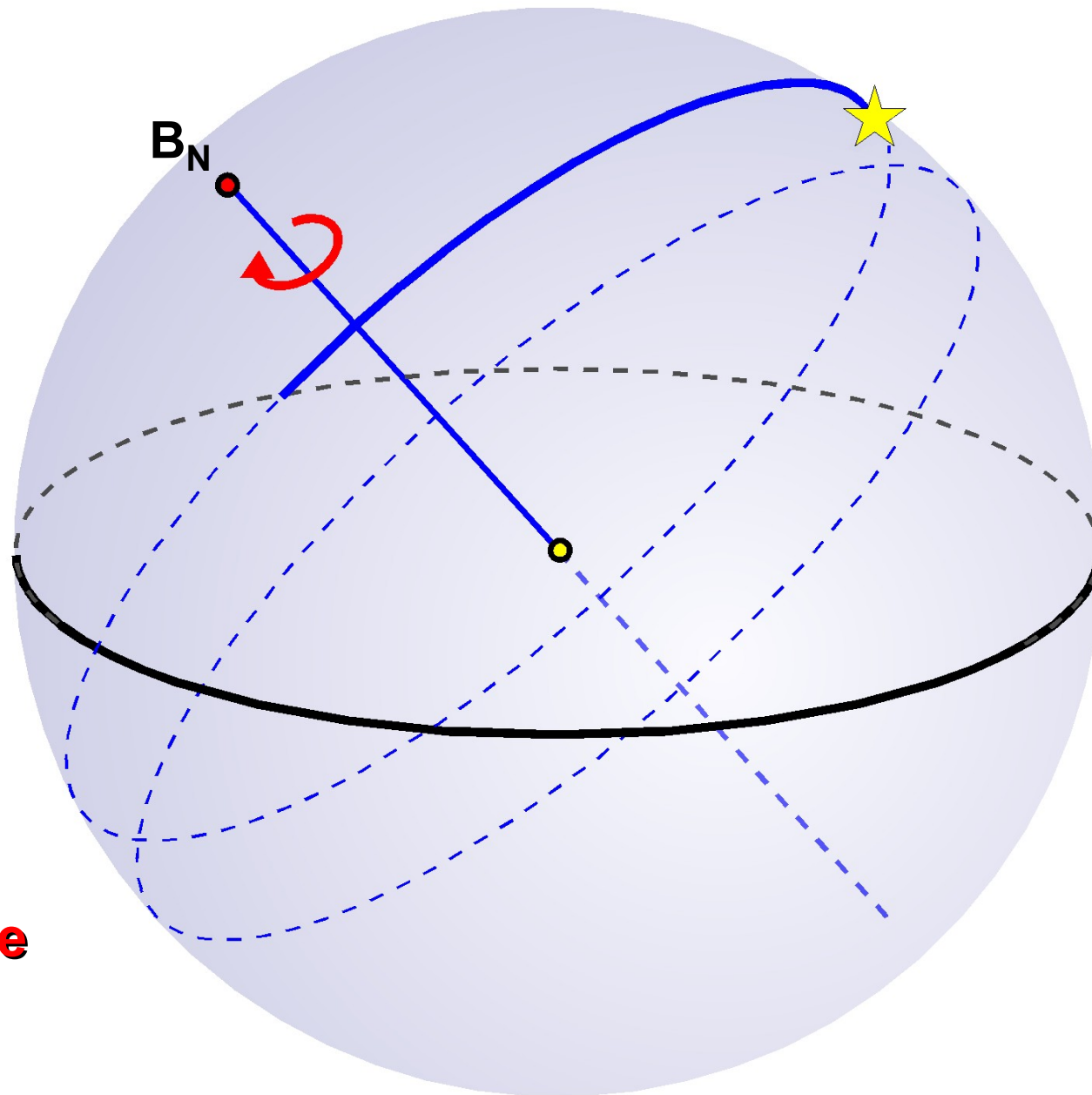
Zachód



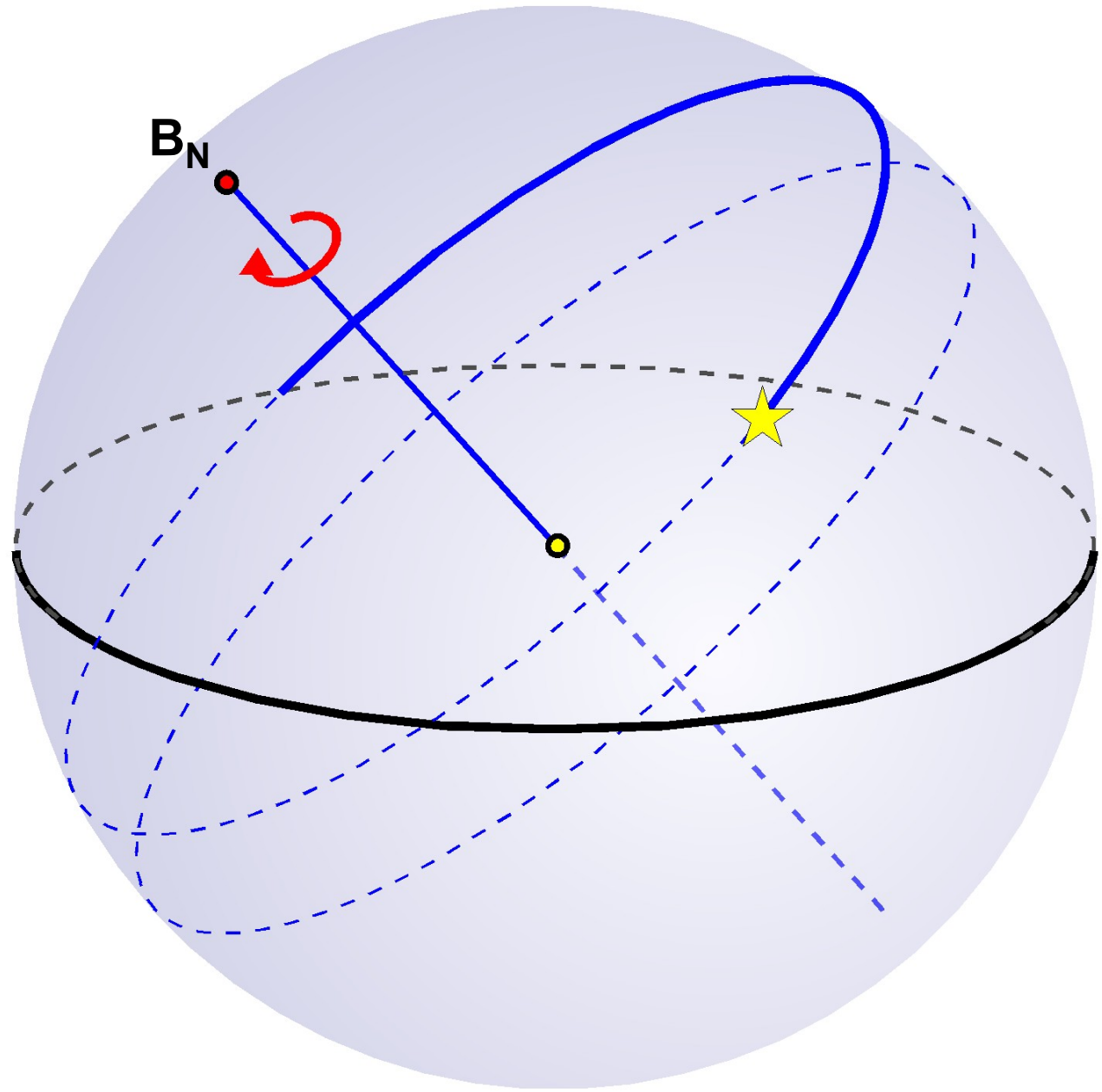
Wschód

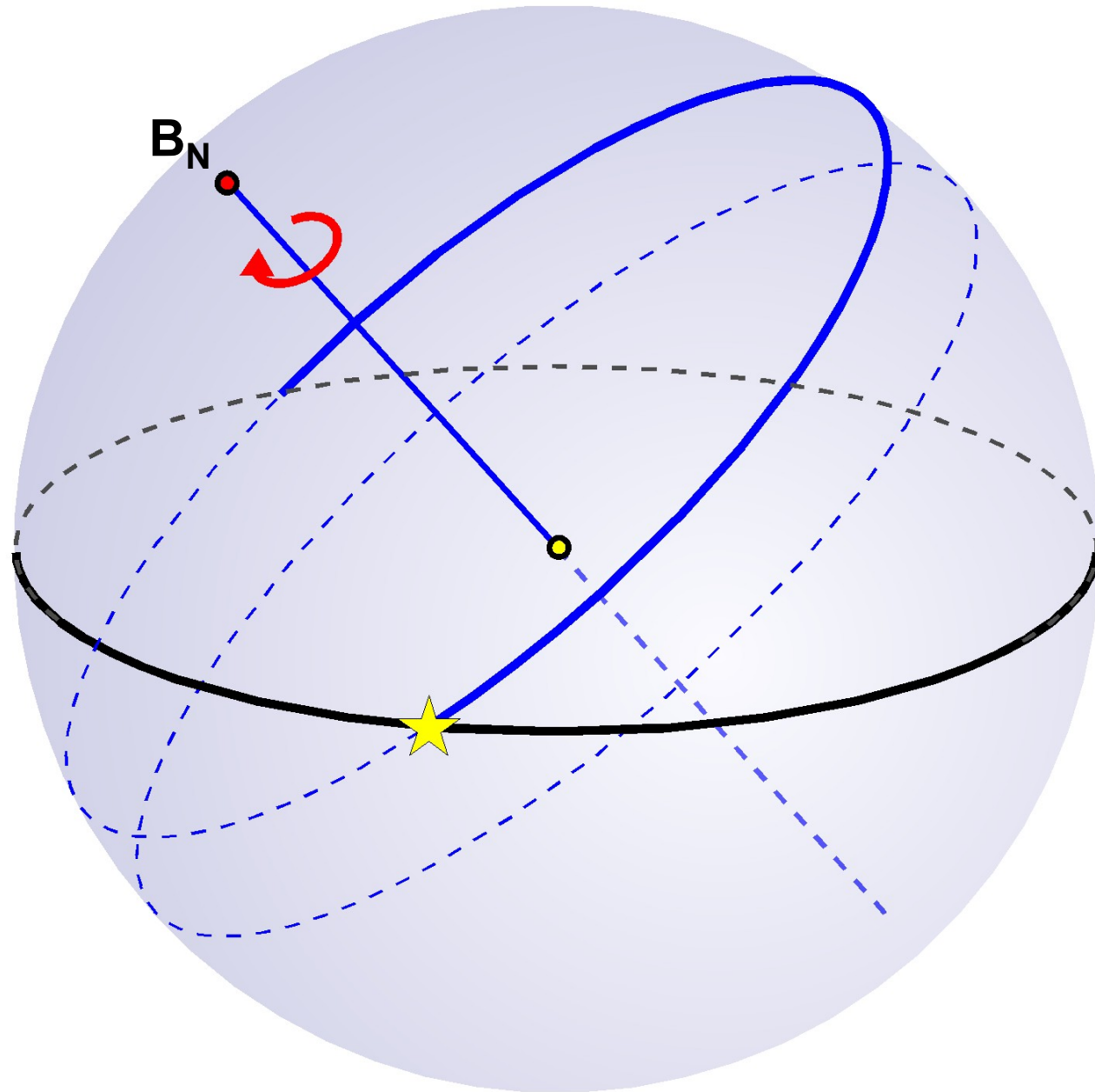




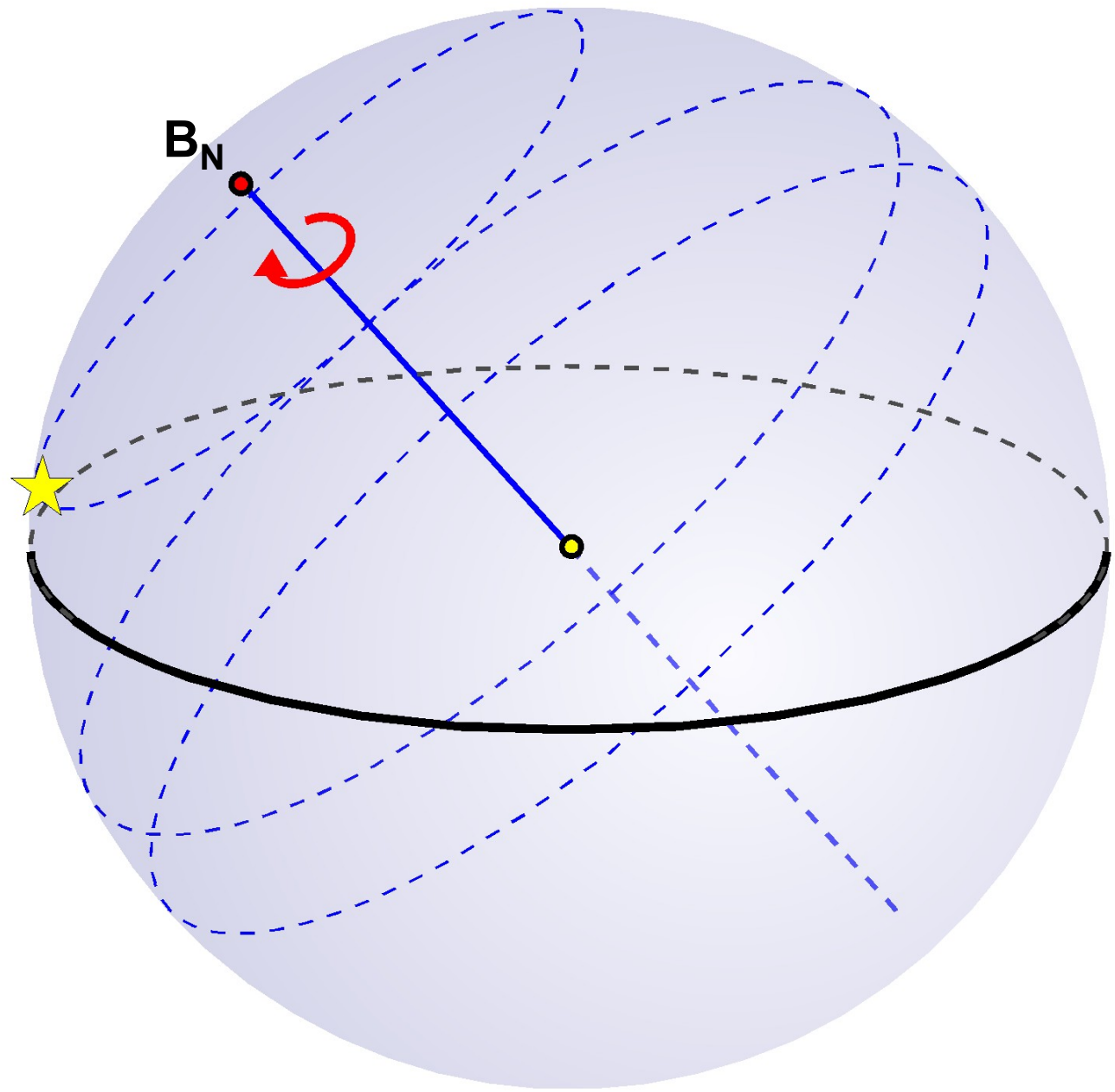


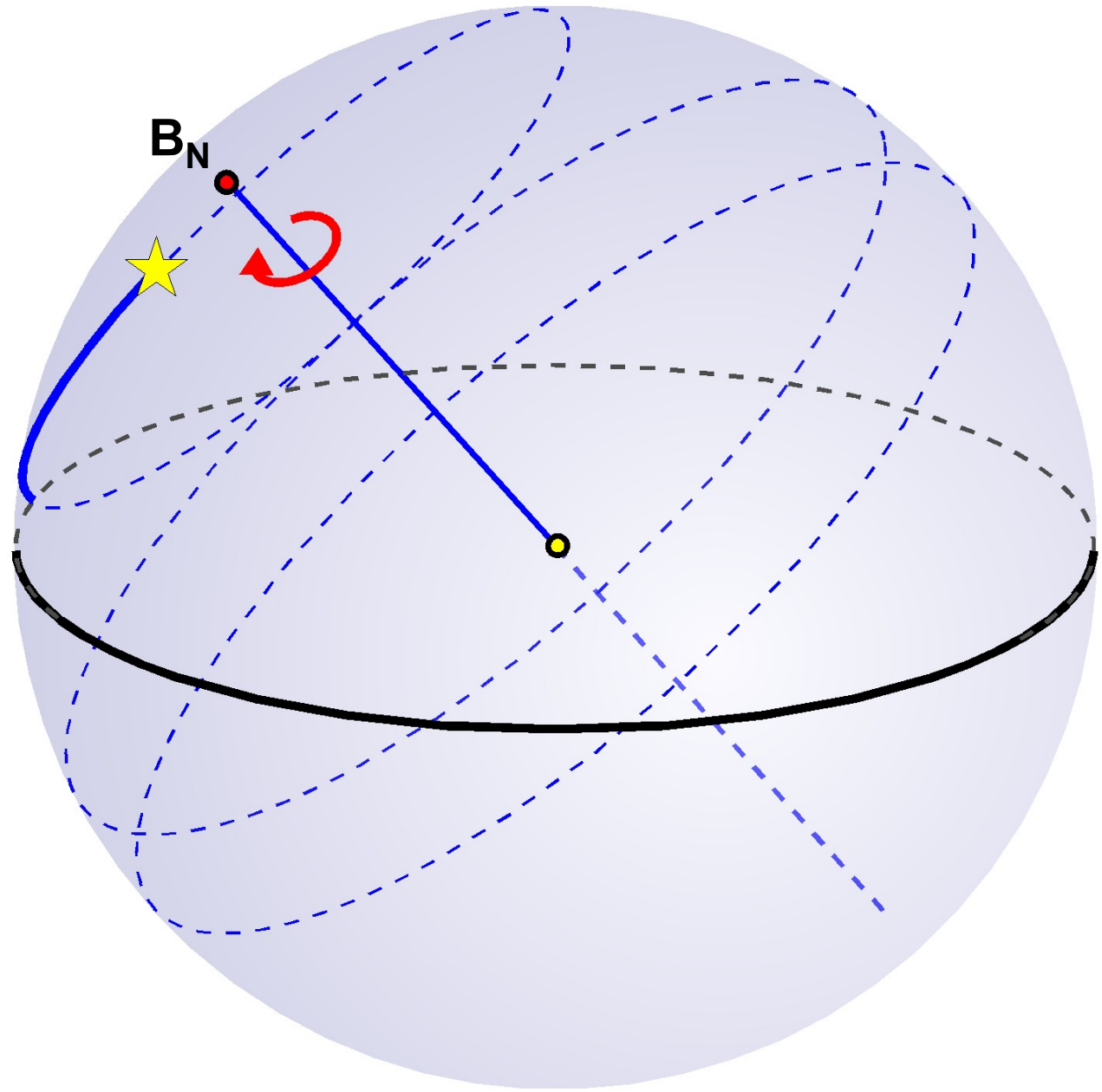
Górowanie

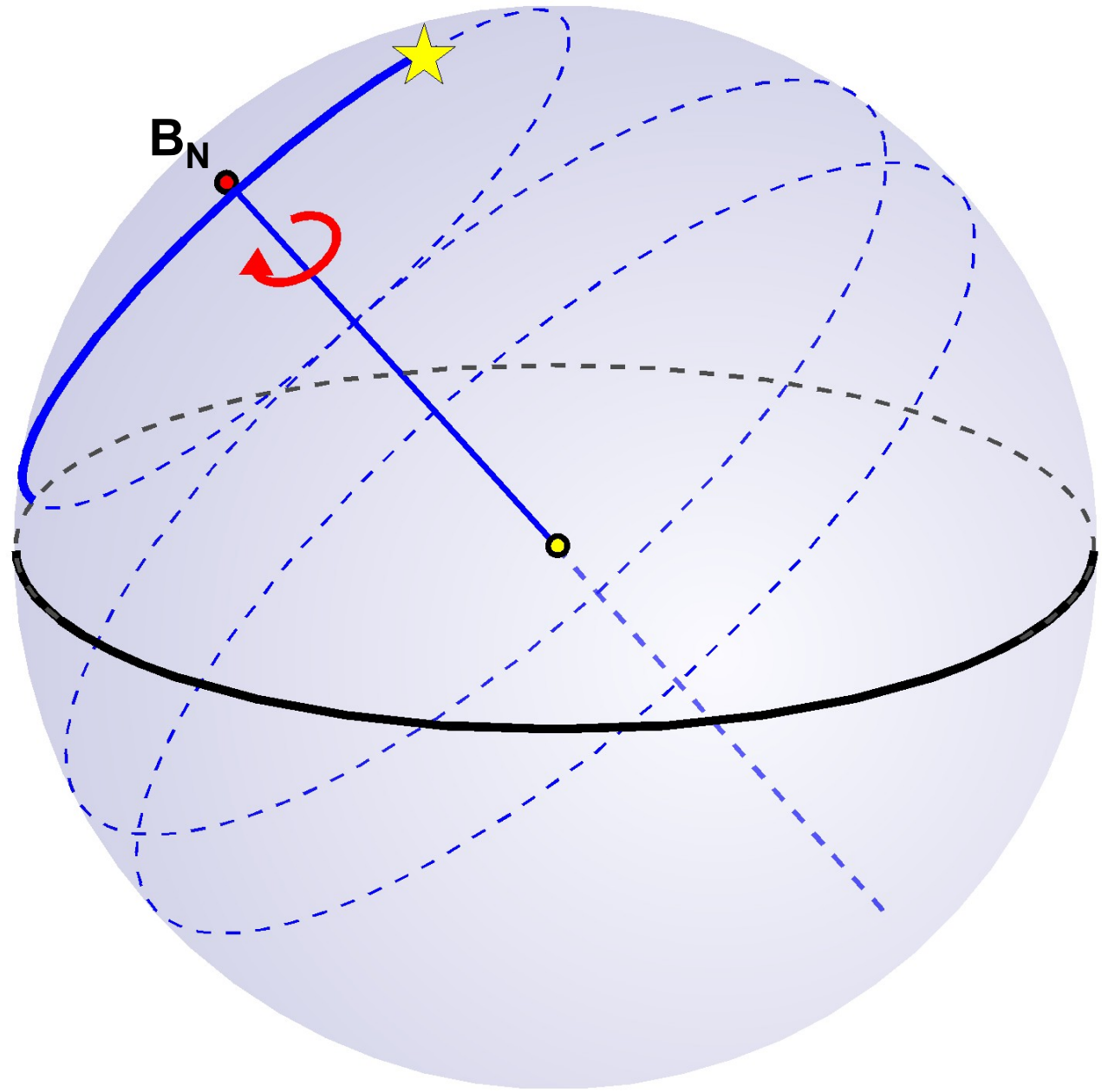


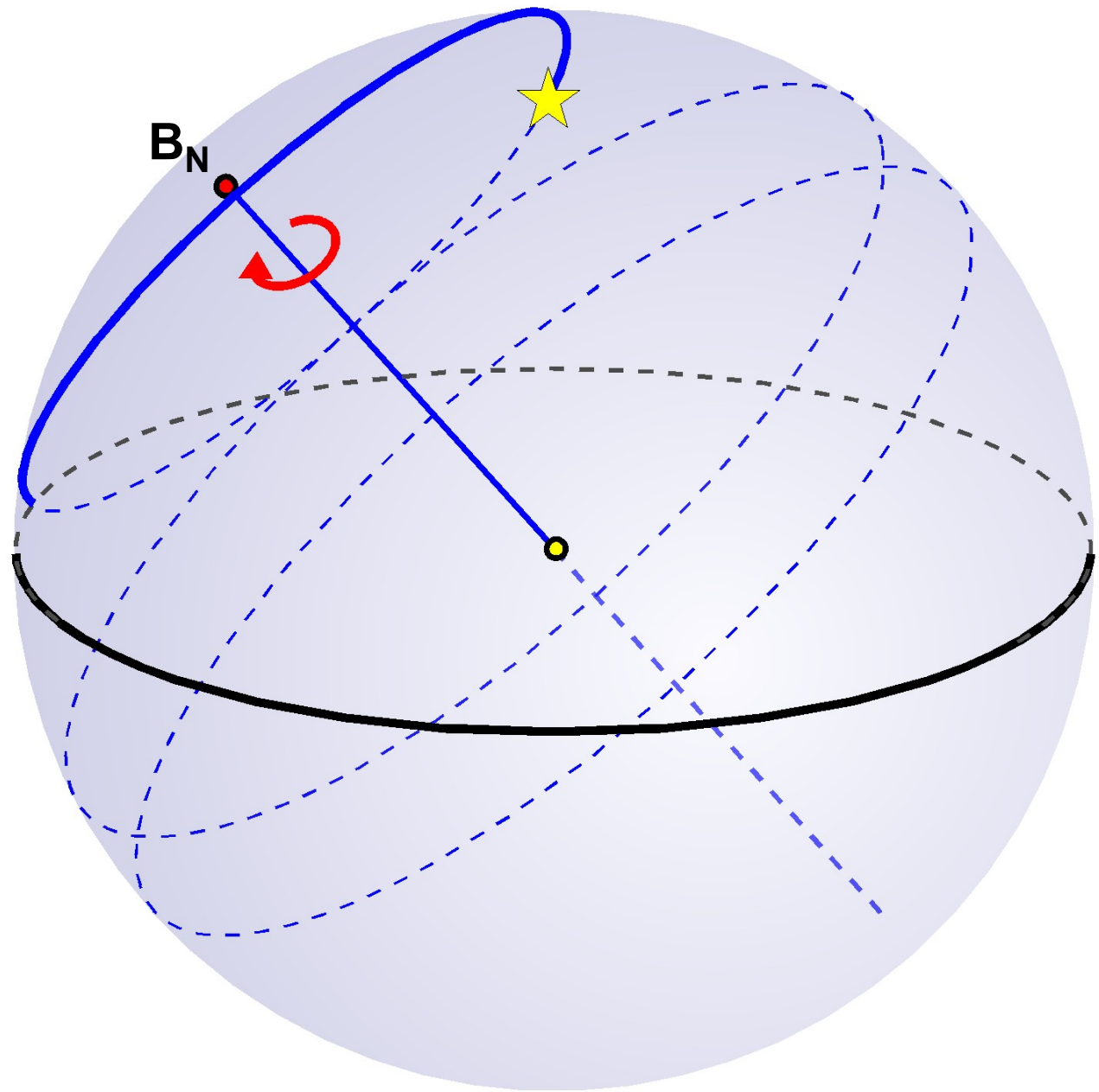


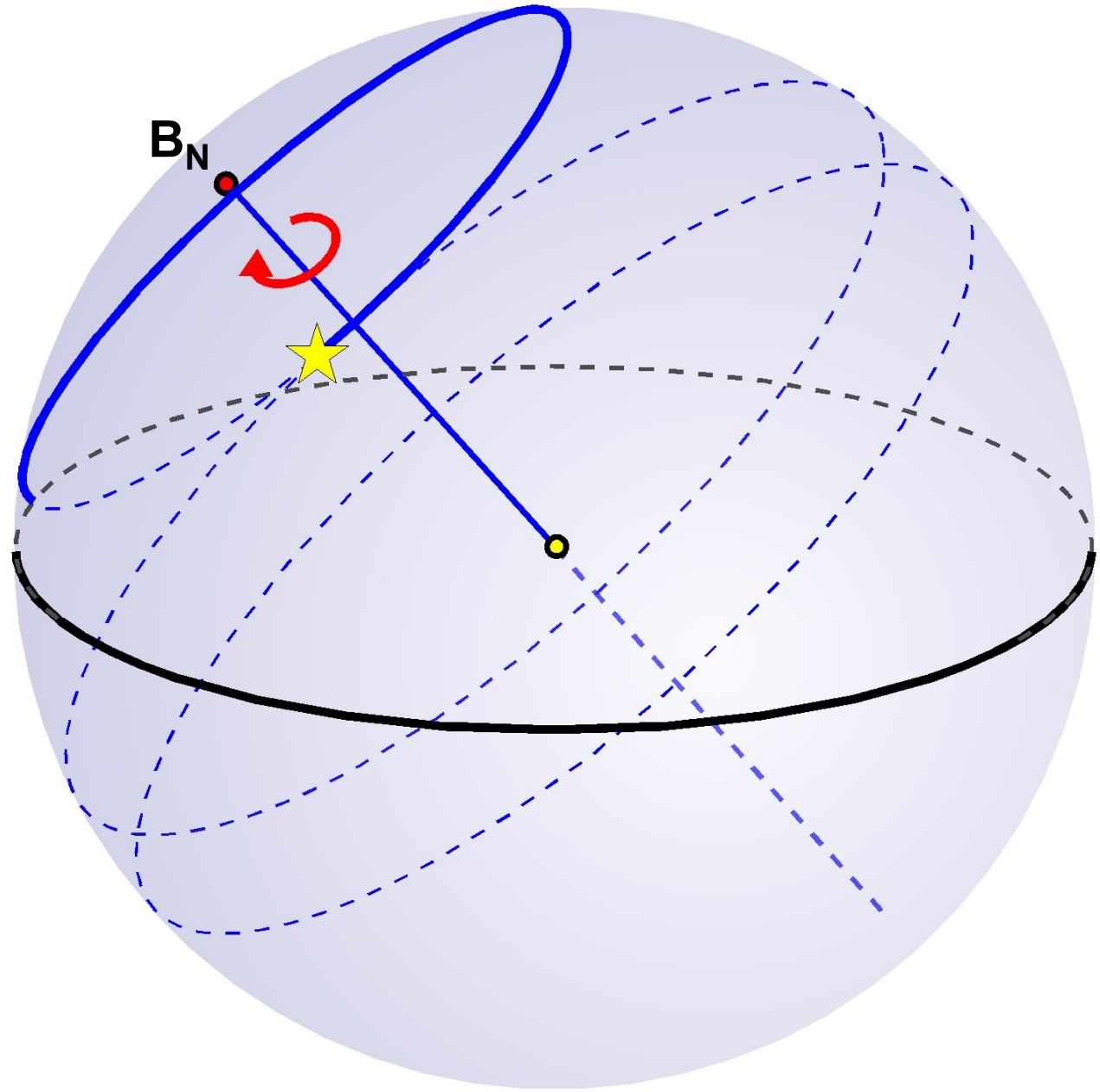
Zachód

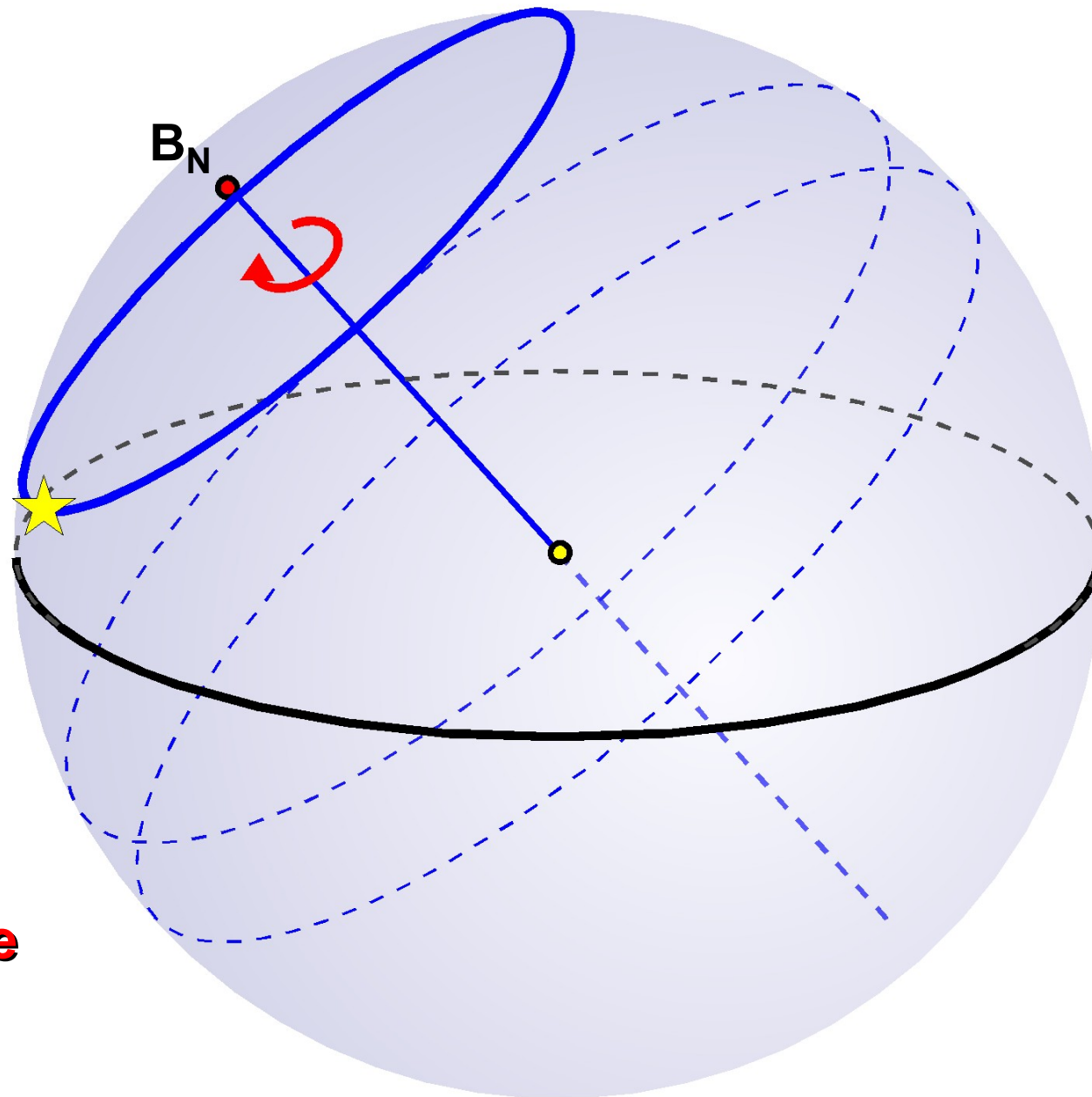




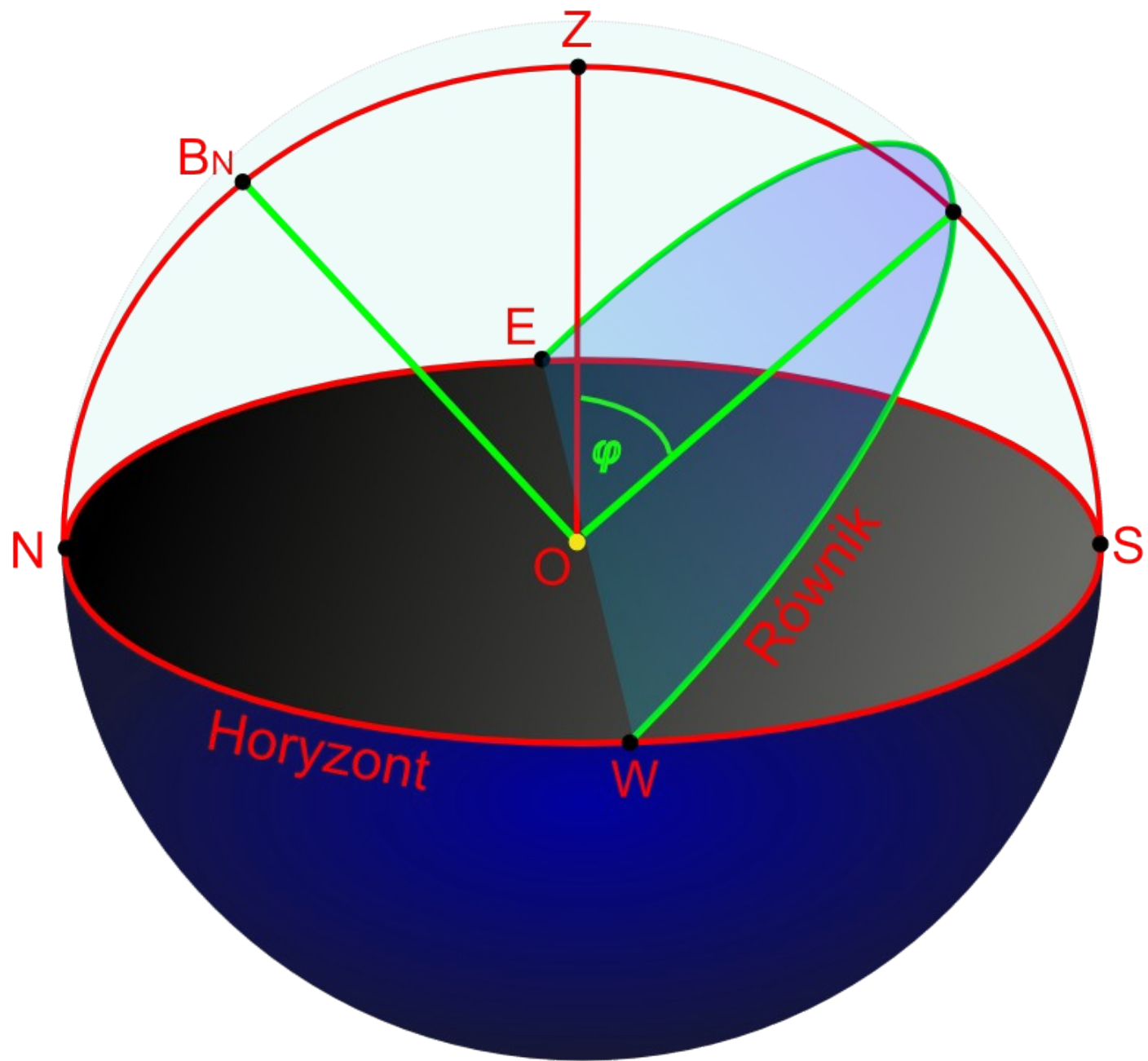


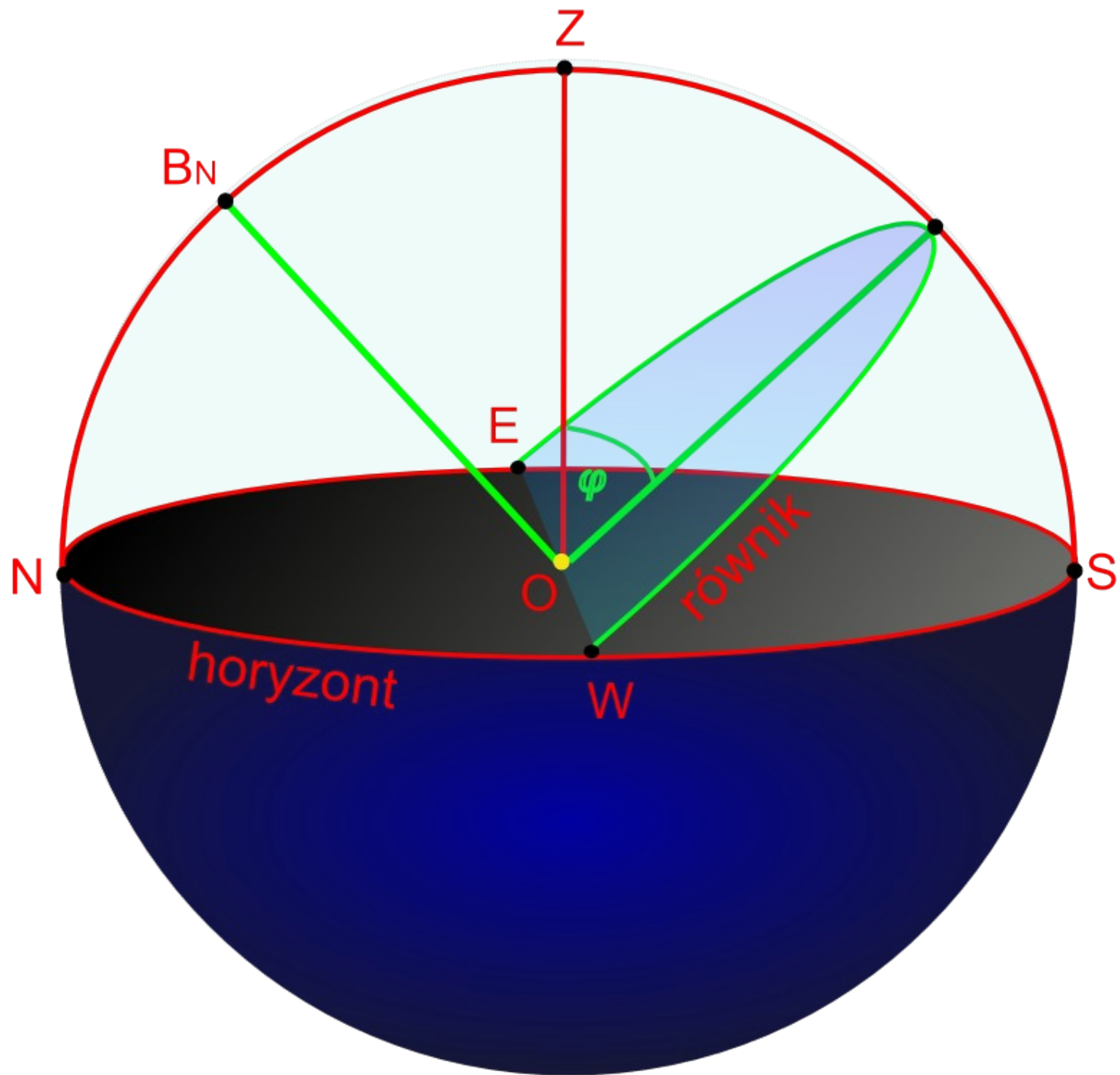


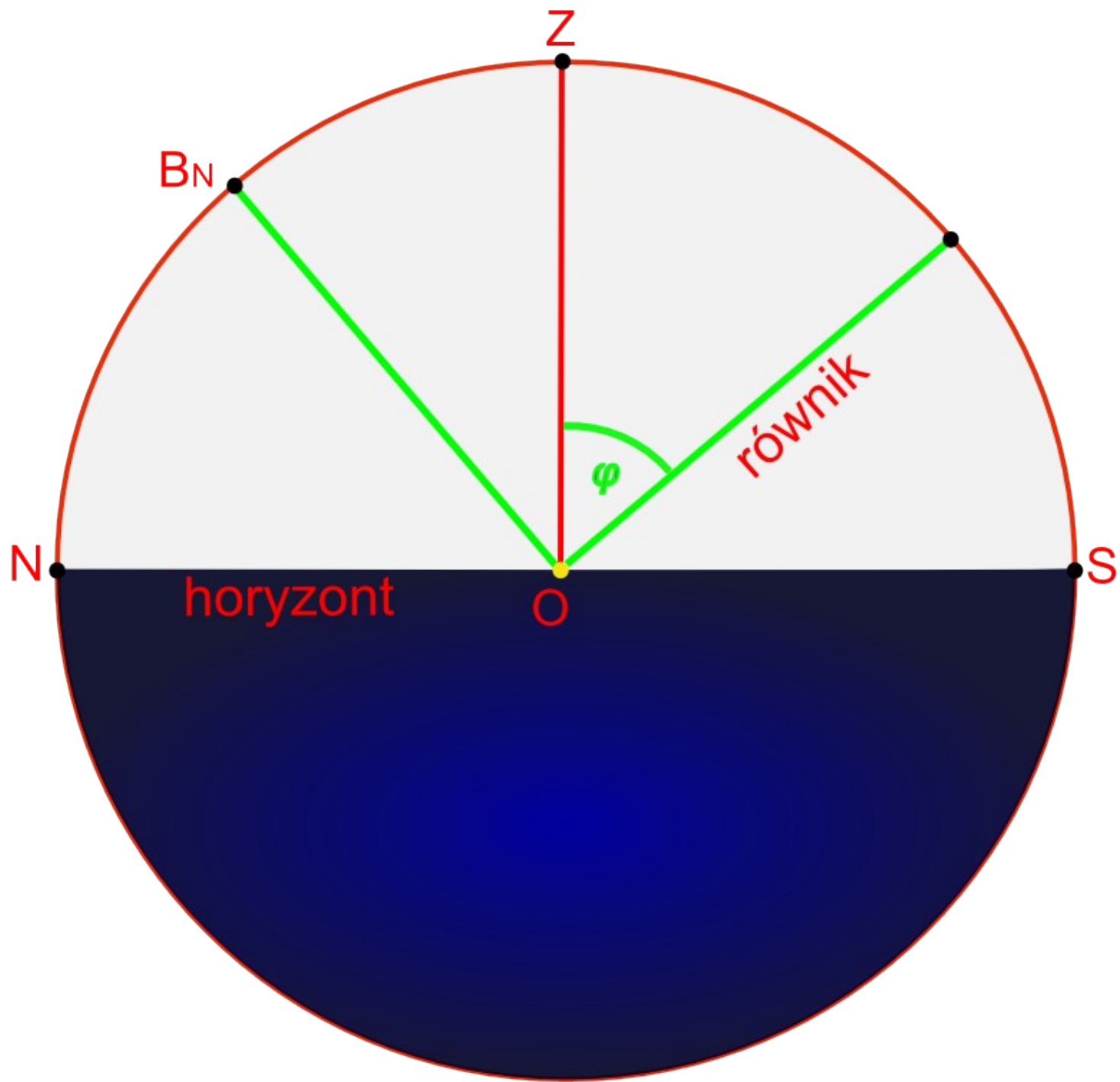


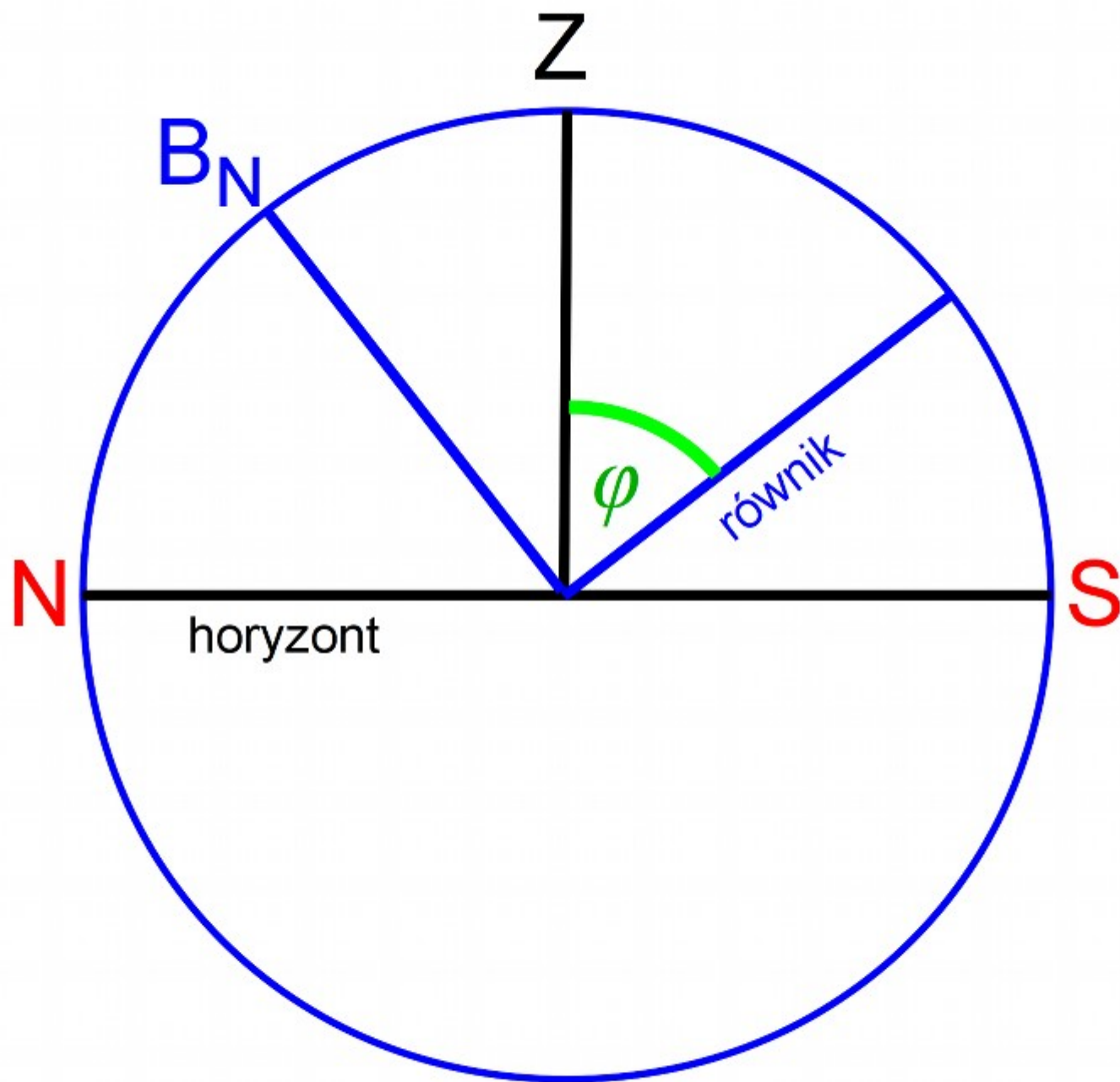


Dołowanie

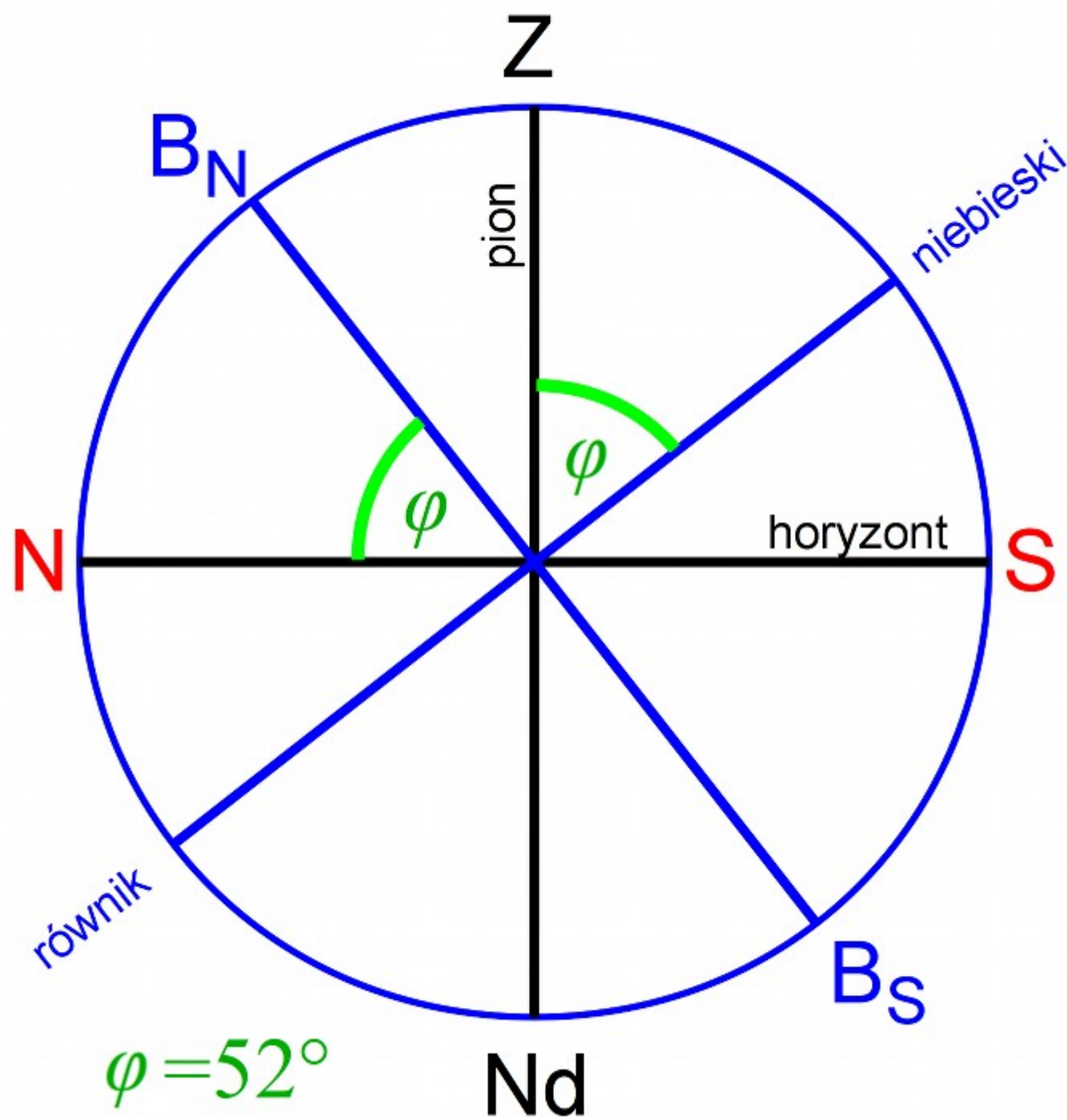


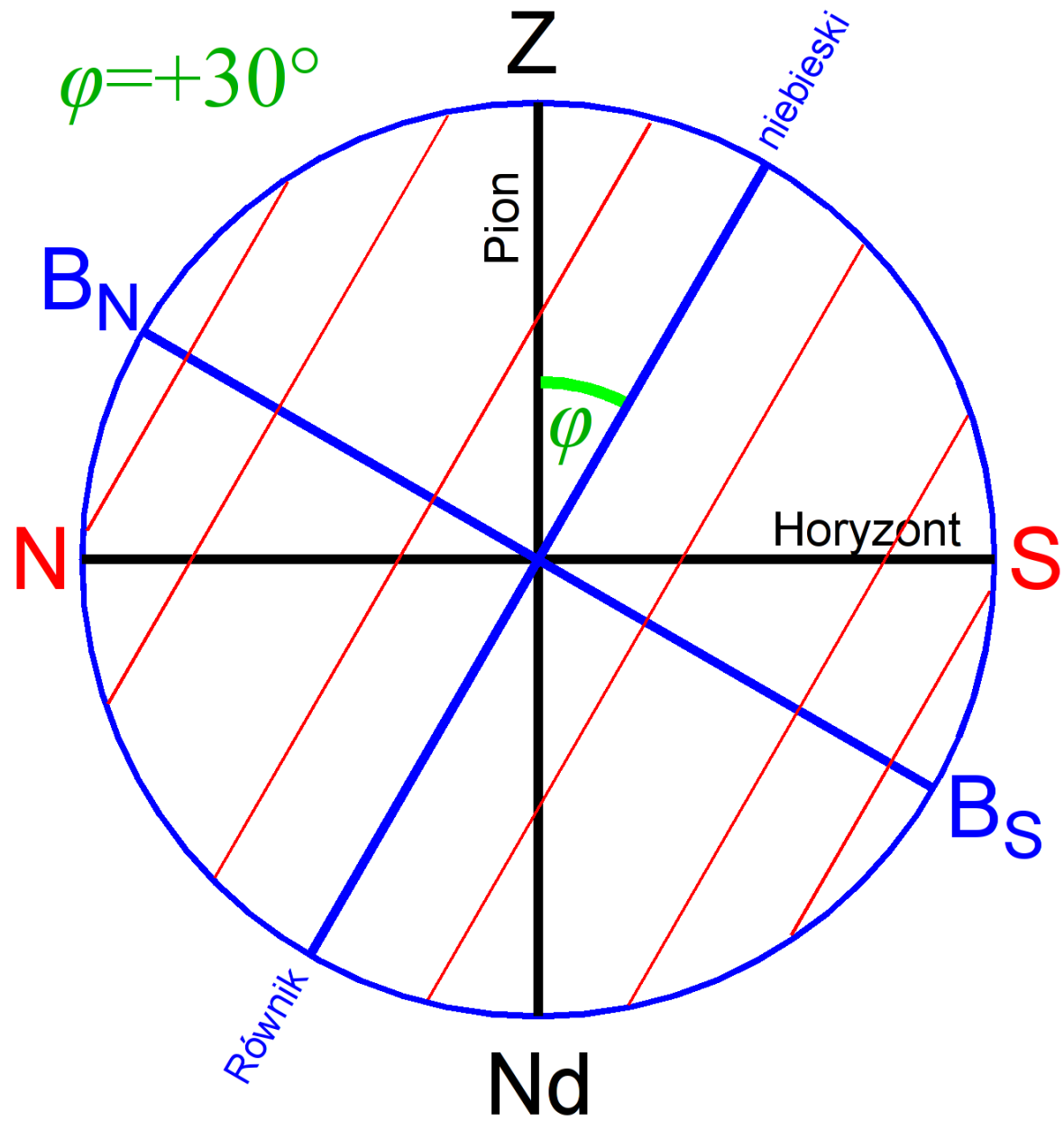


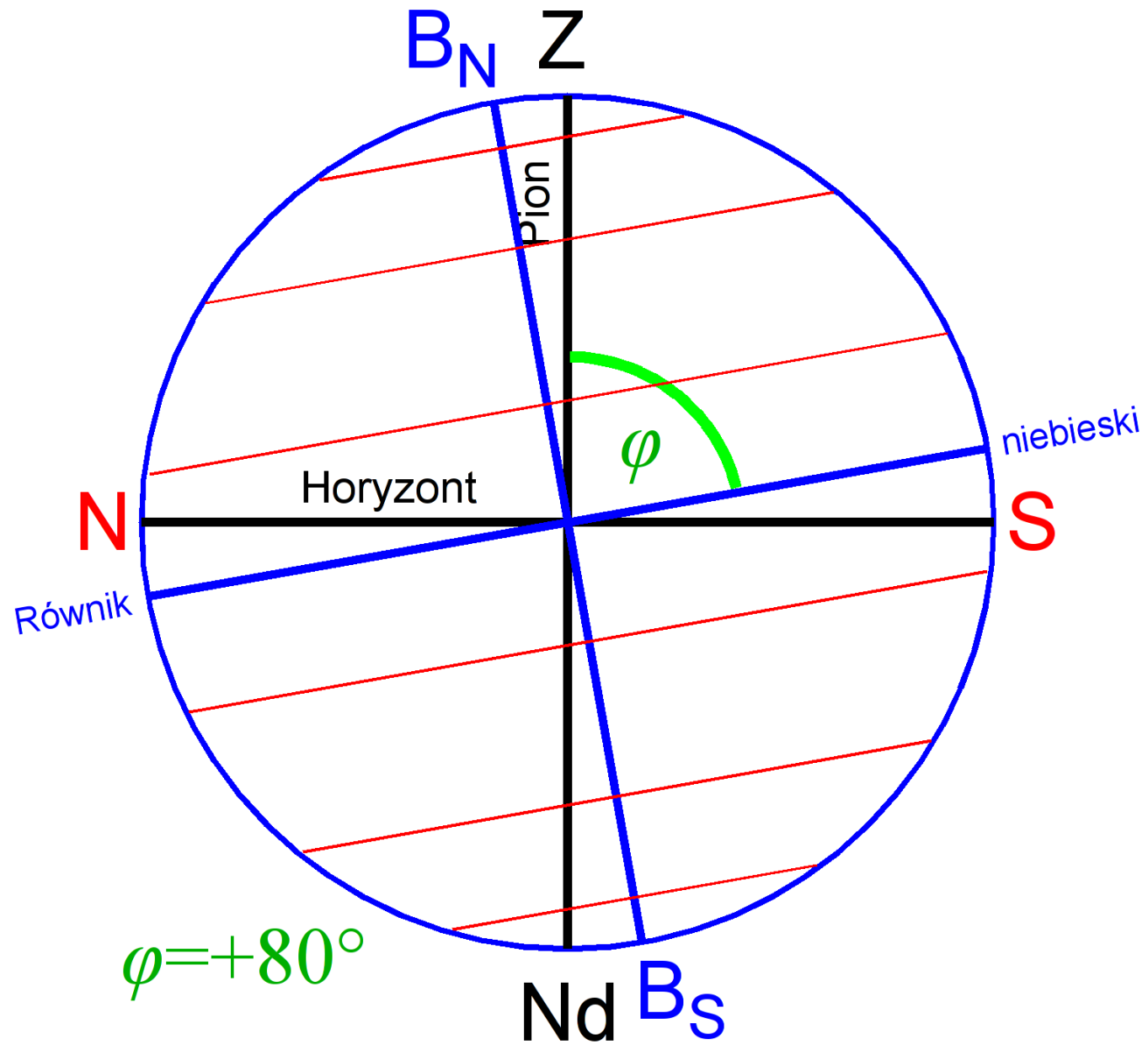


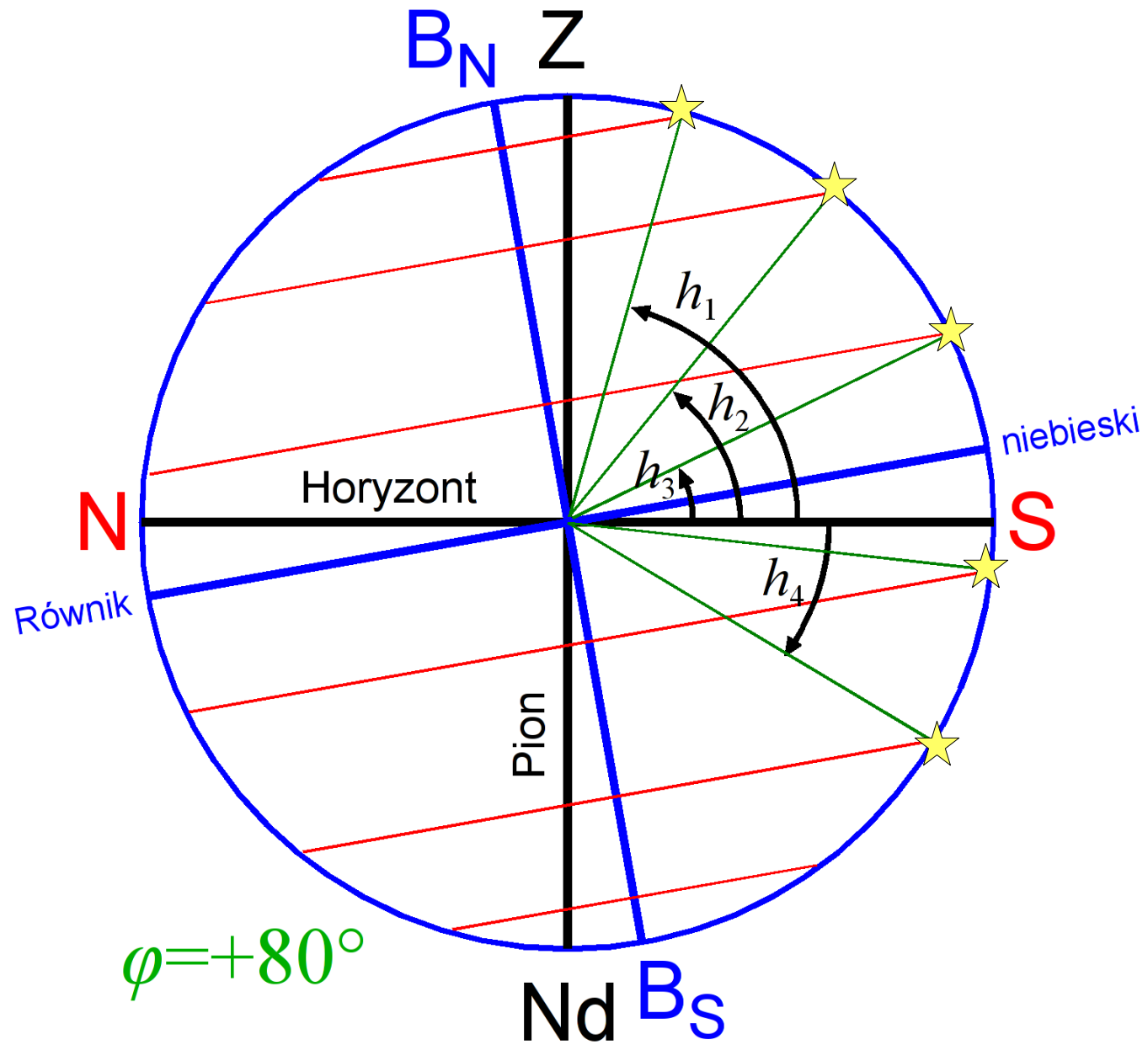


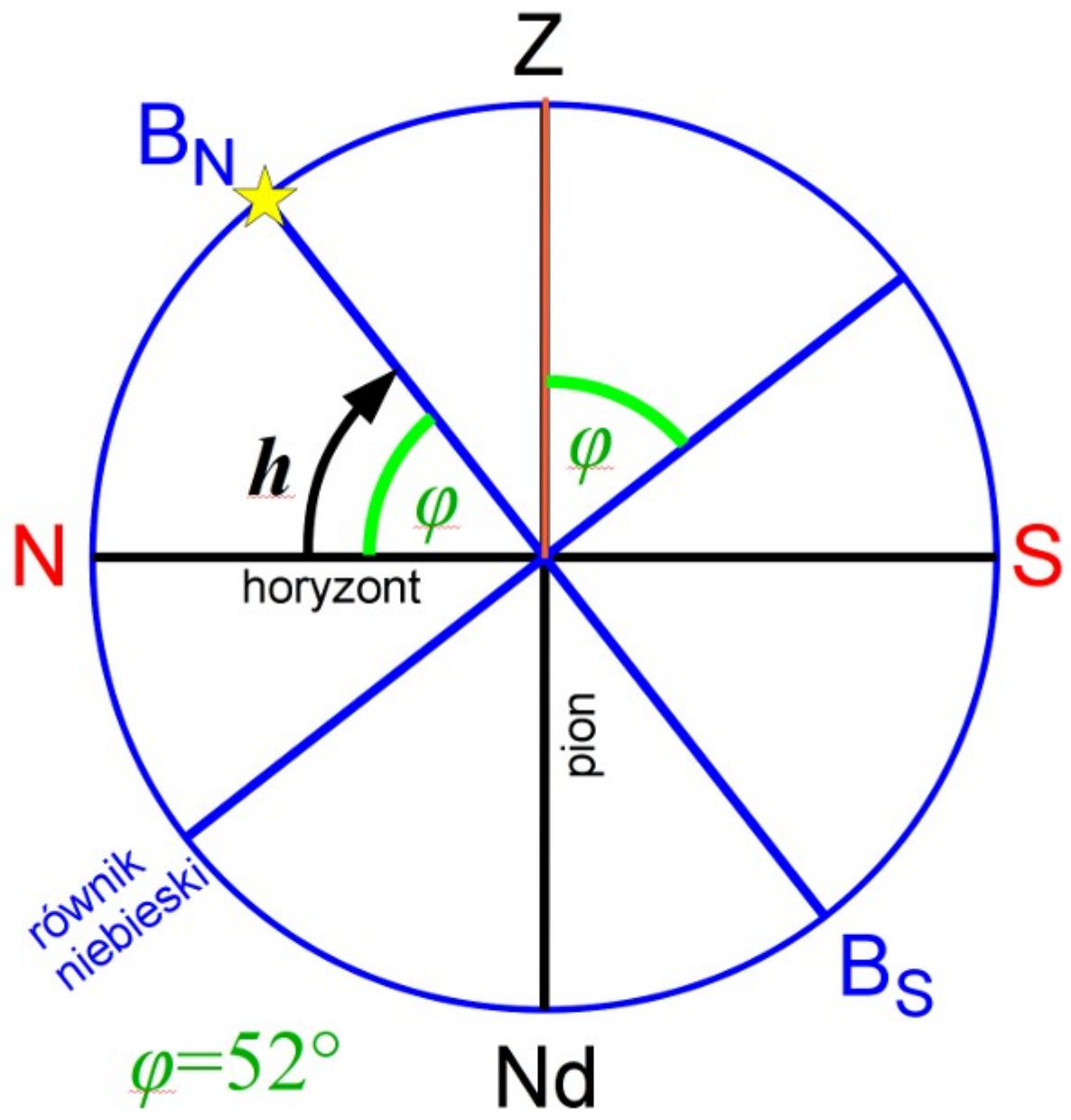
$$\varphi = 52^\circ$$





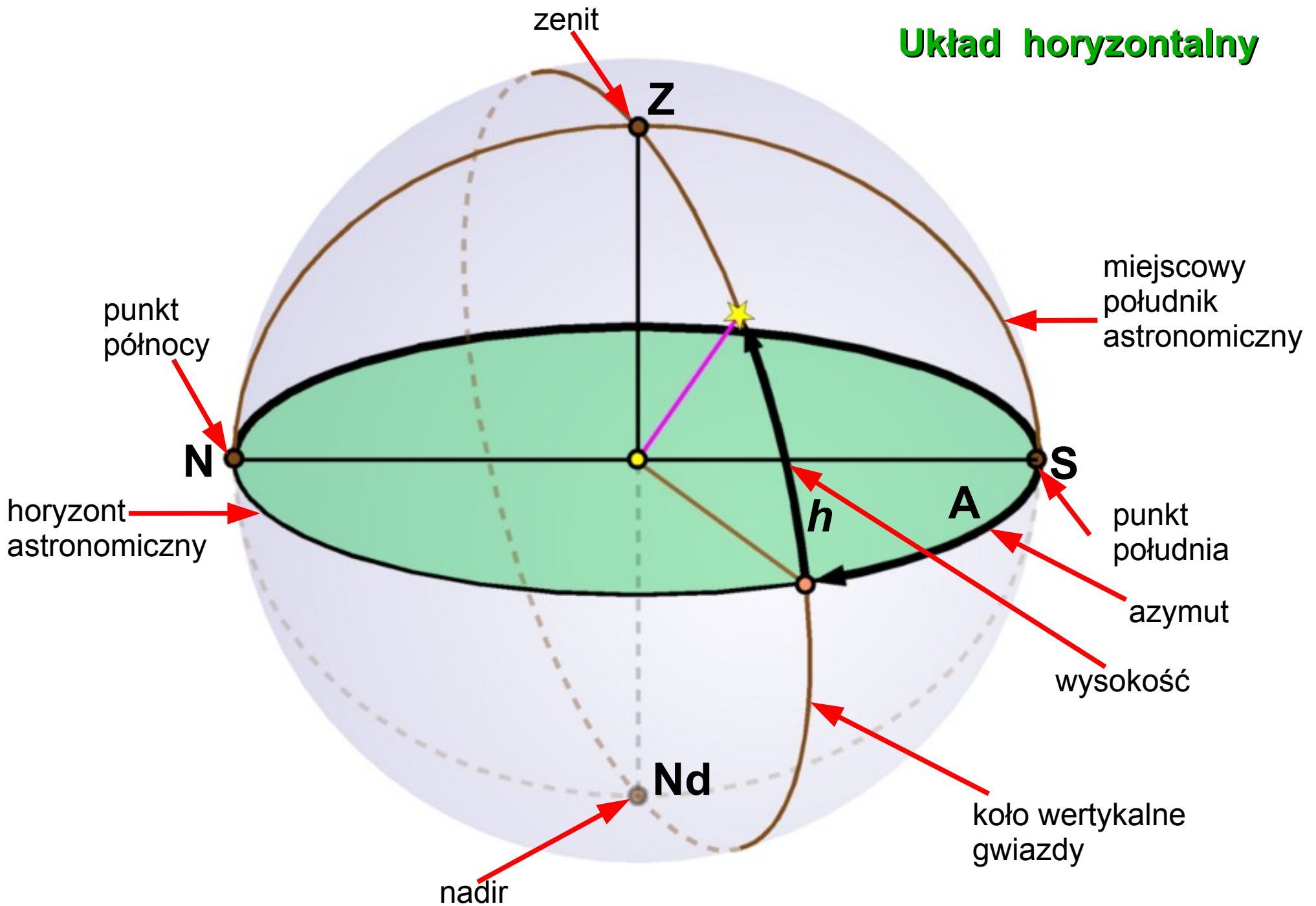




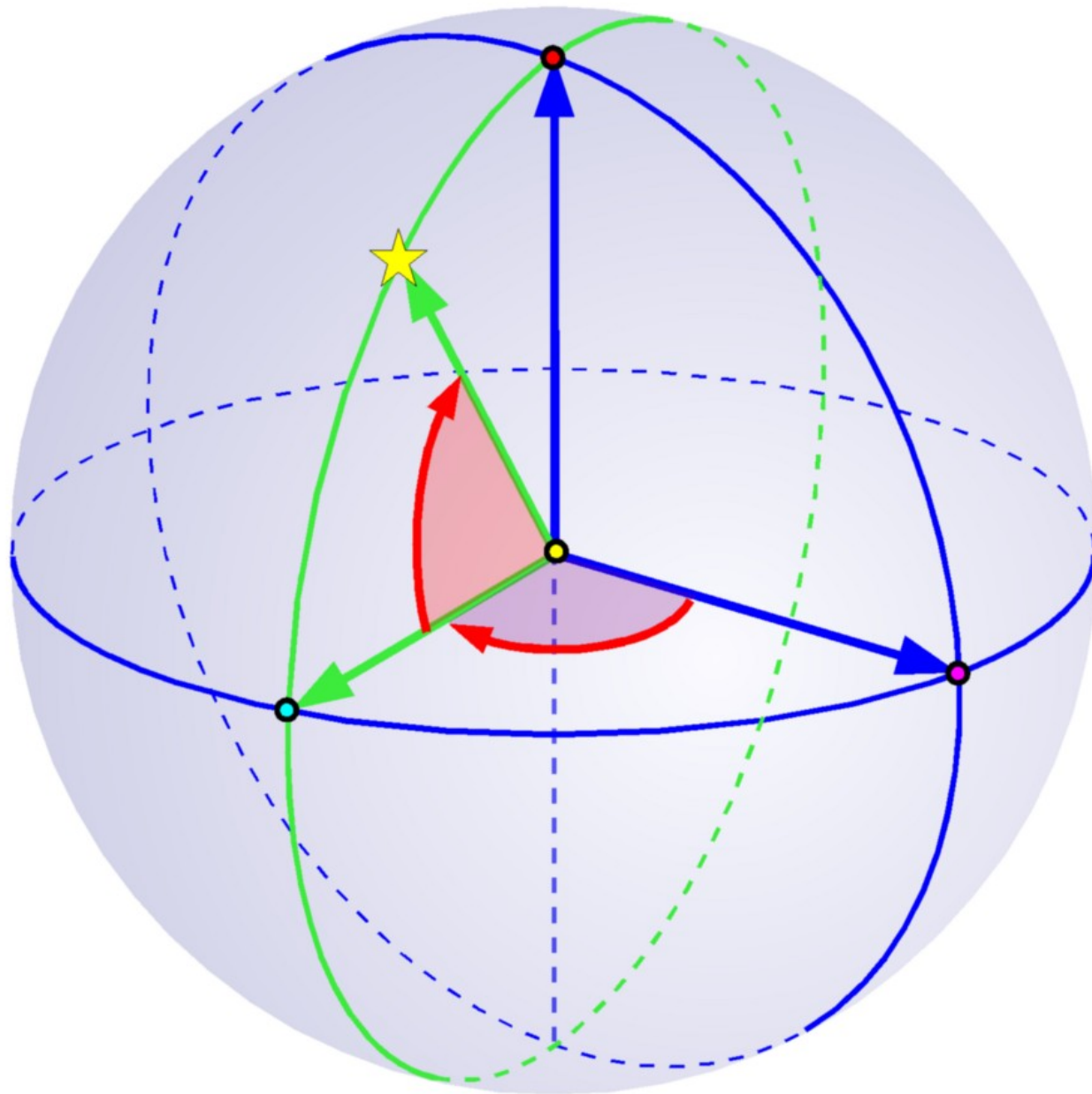




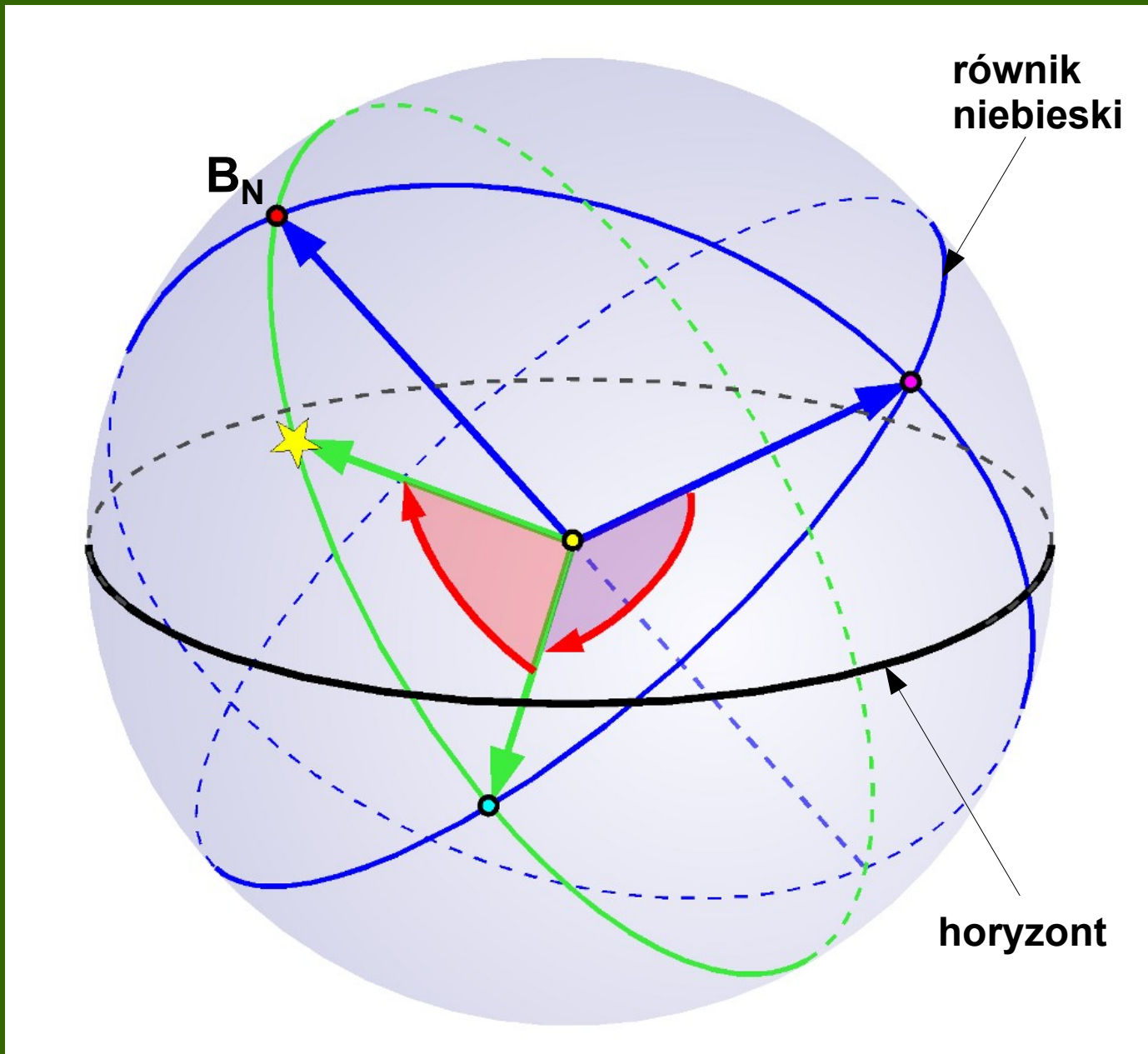
Układ horyzontalny



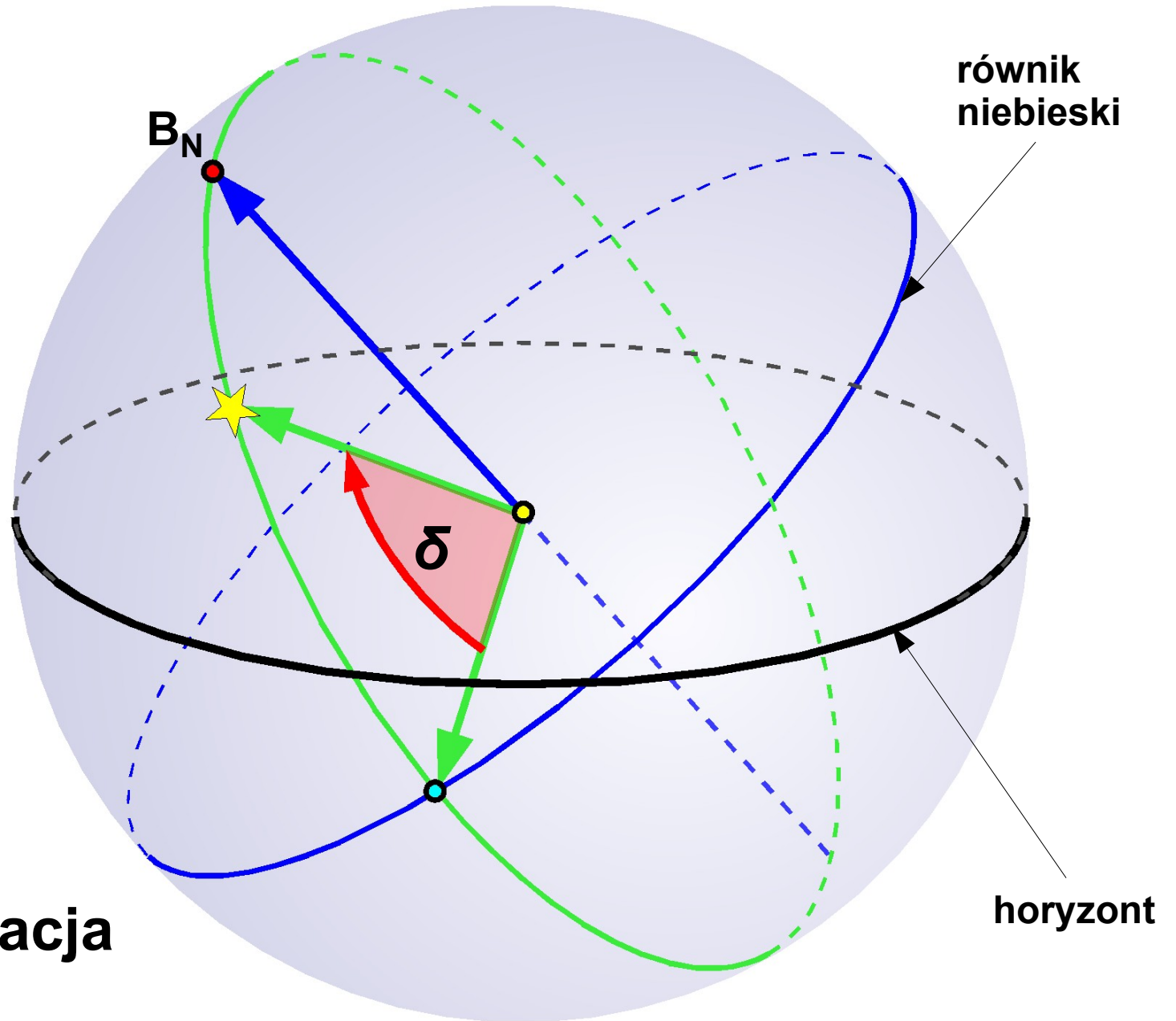
Współrzędne sferyczne

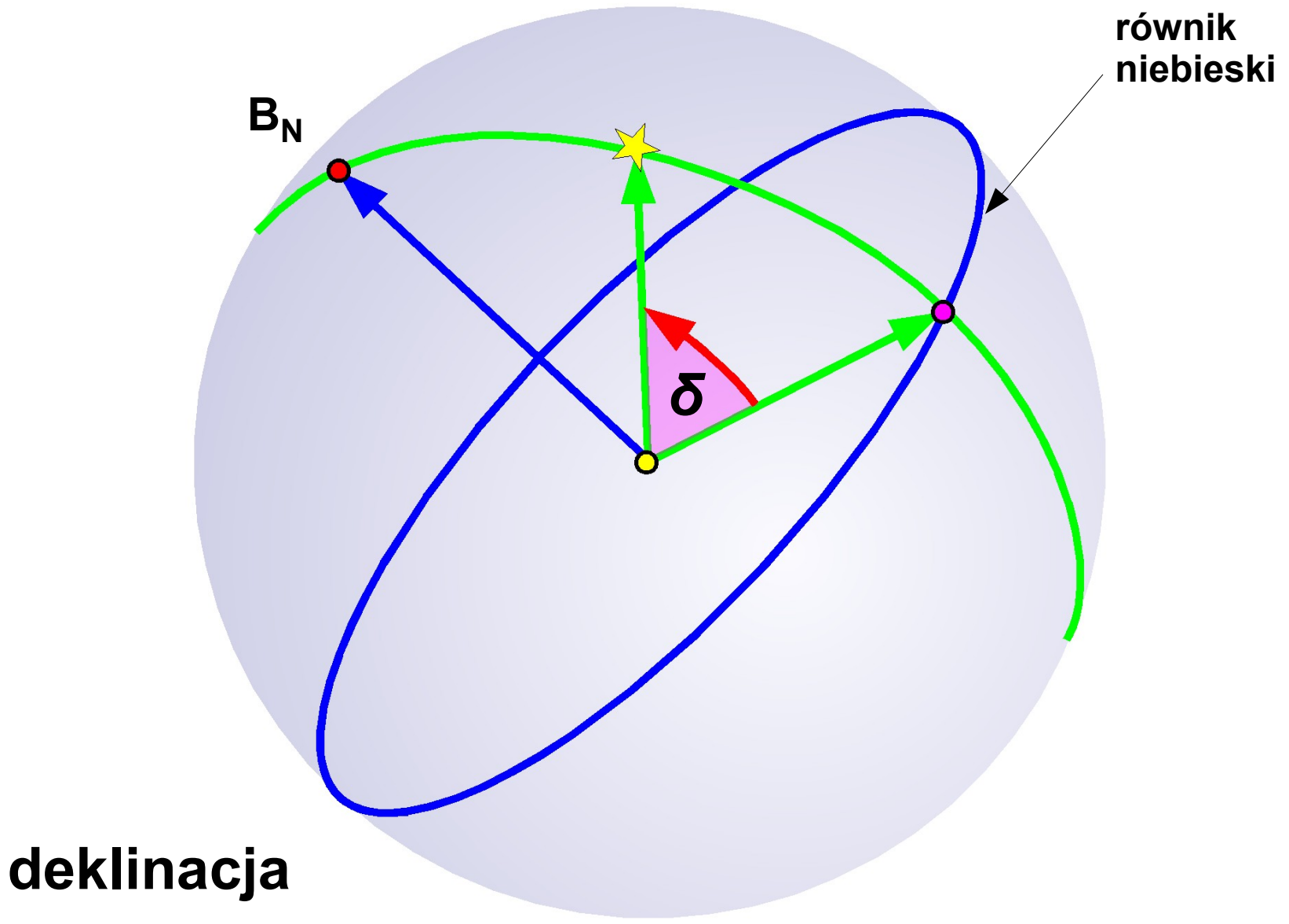


Współrzędne sferyczne



deklinacja

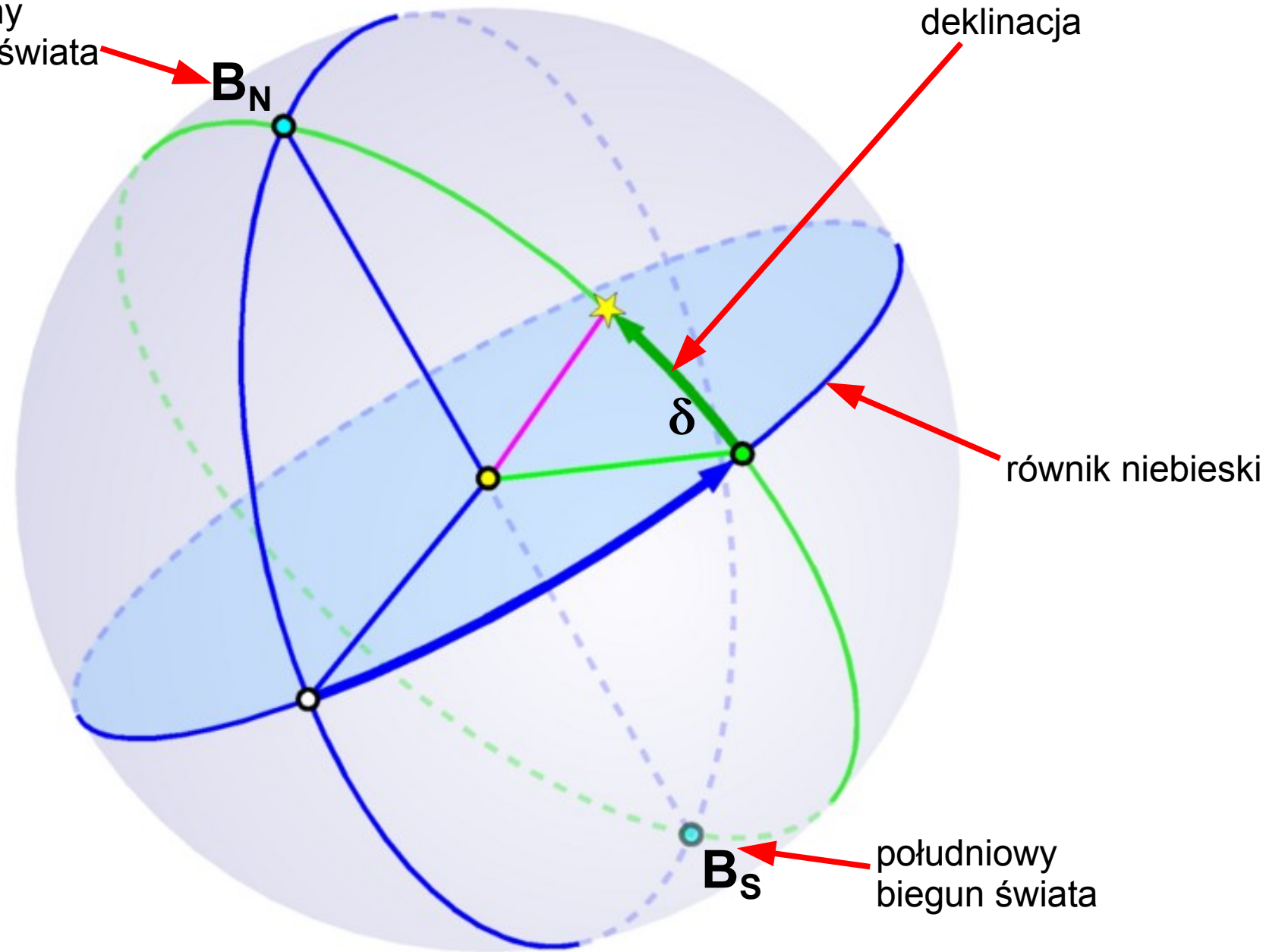




północny
biegun świata

B_N

deklinacja

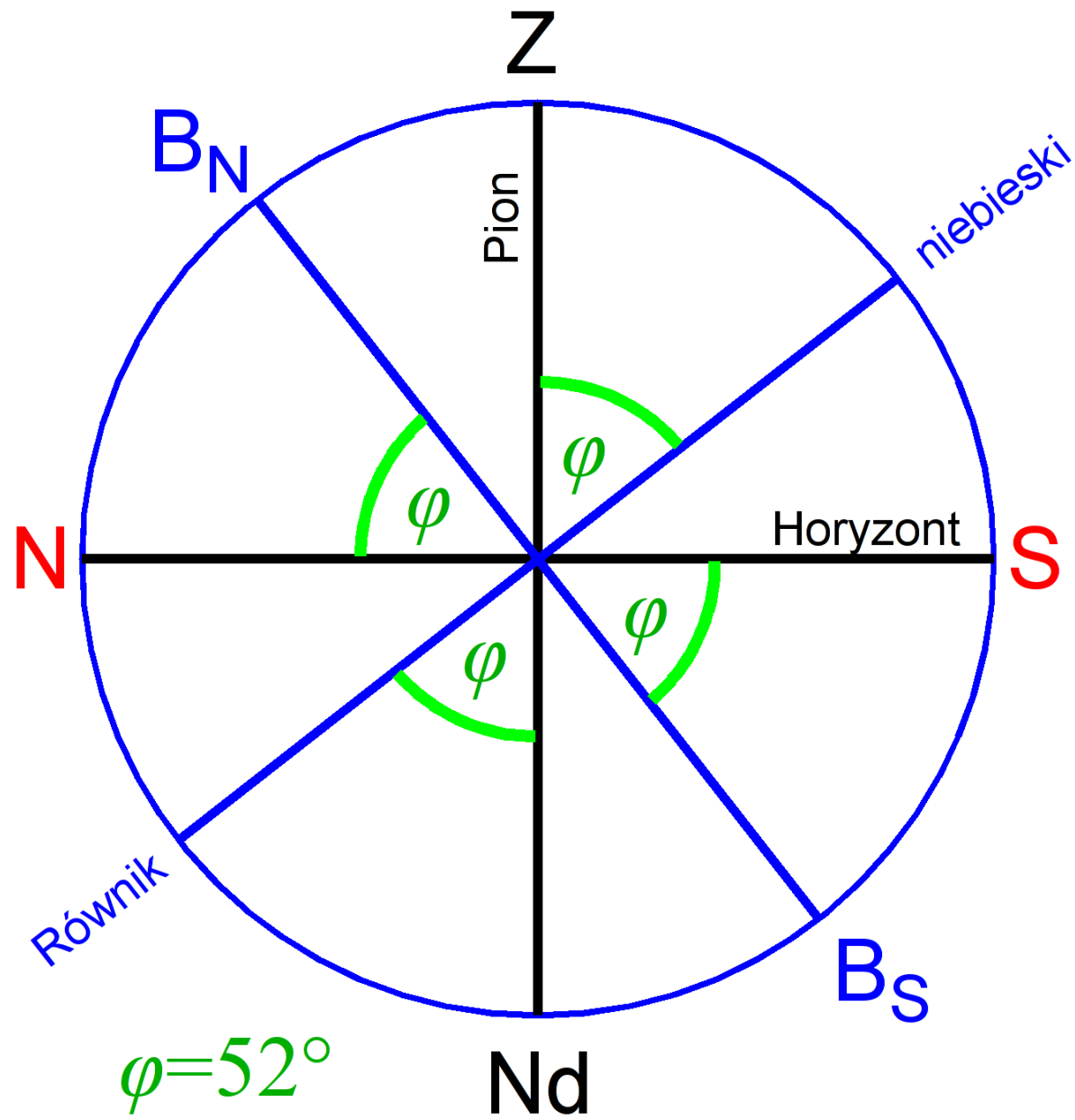


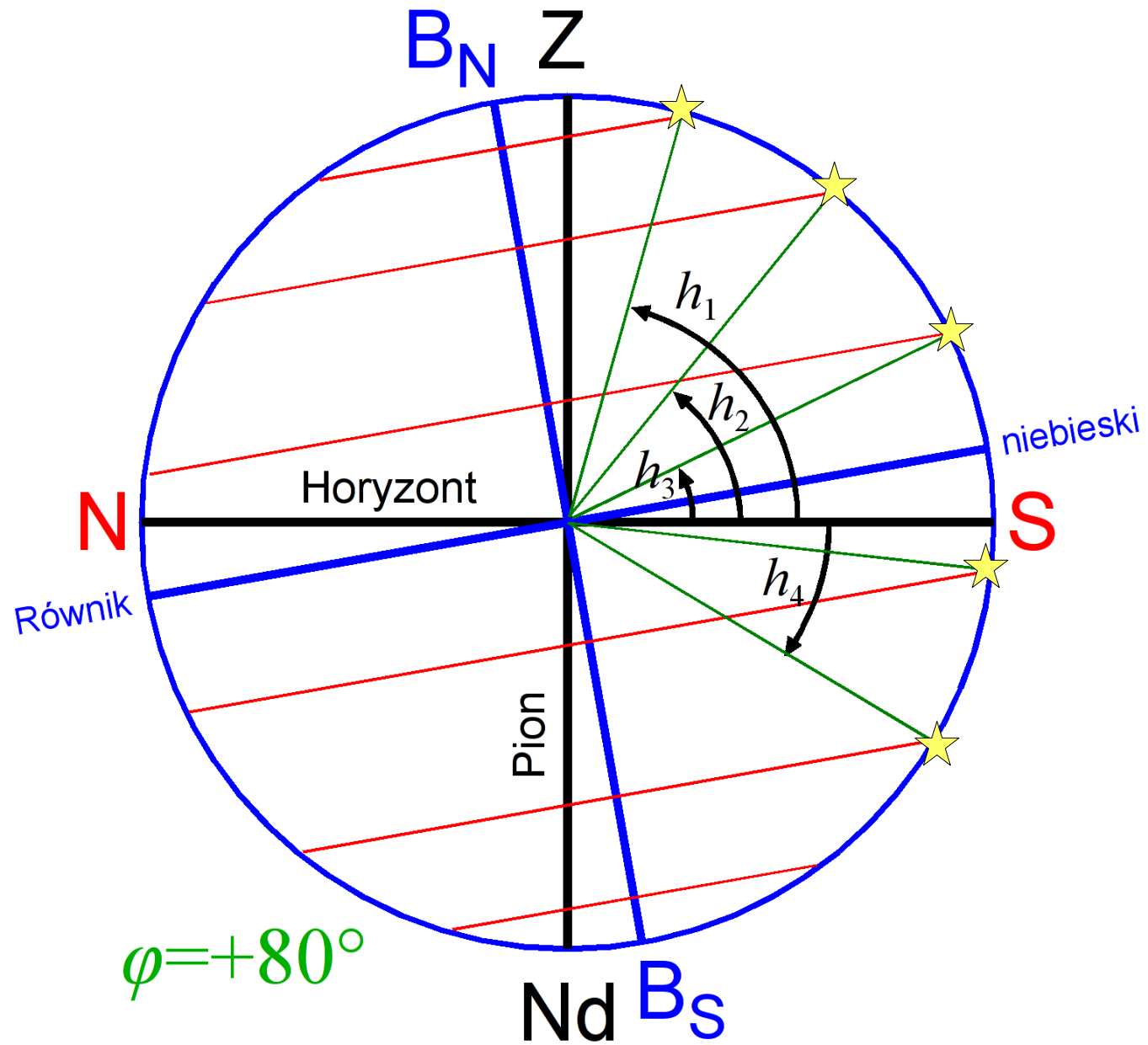
równik niebieski

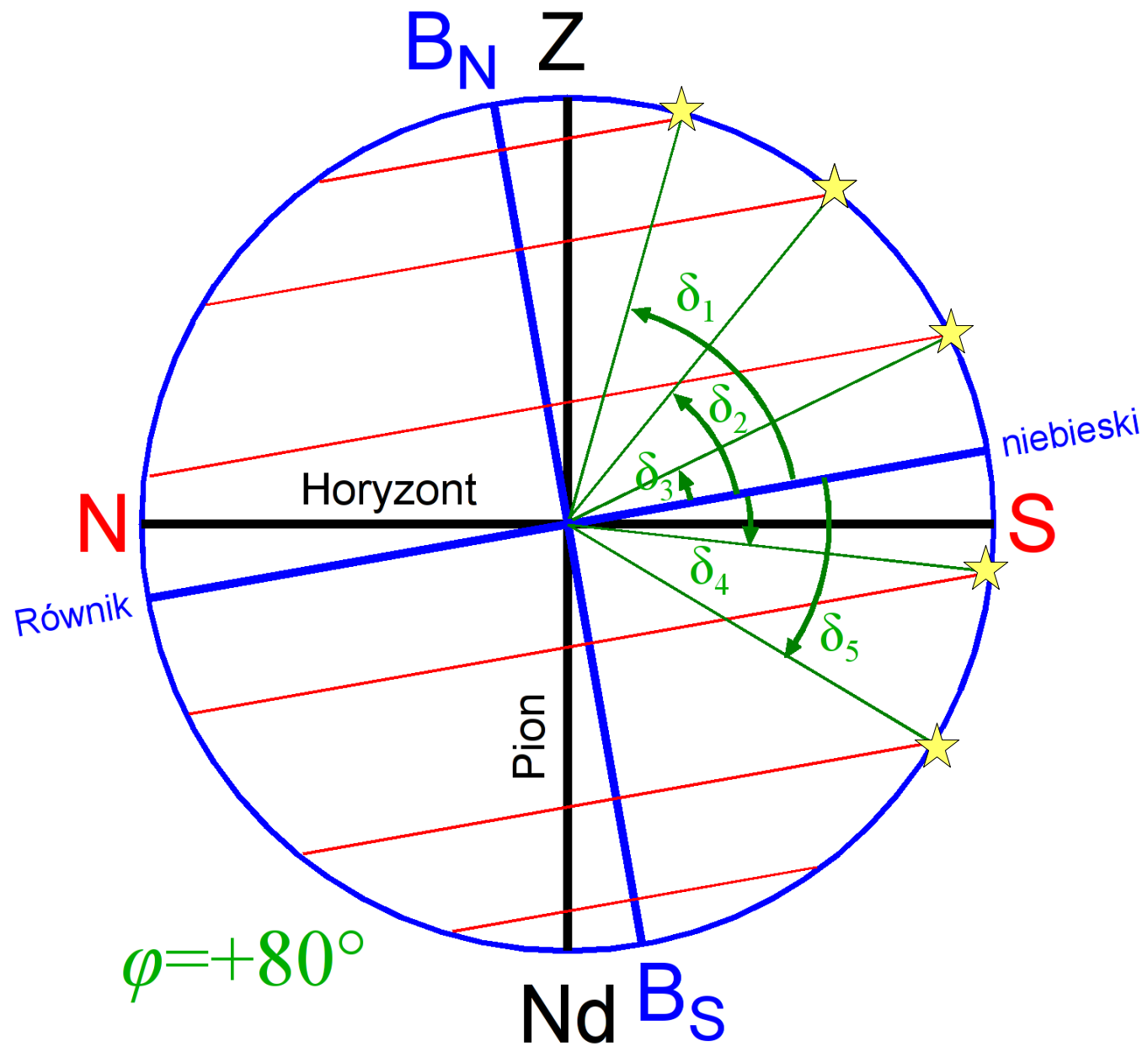
B_S

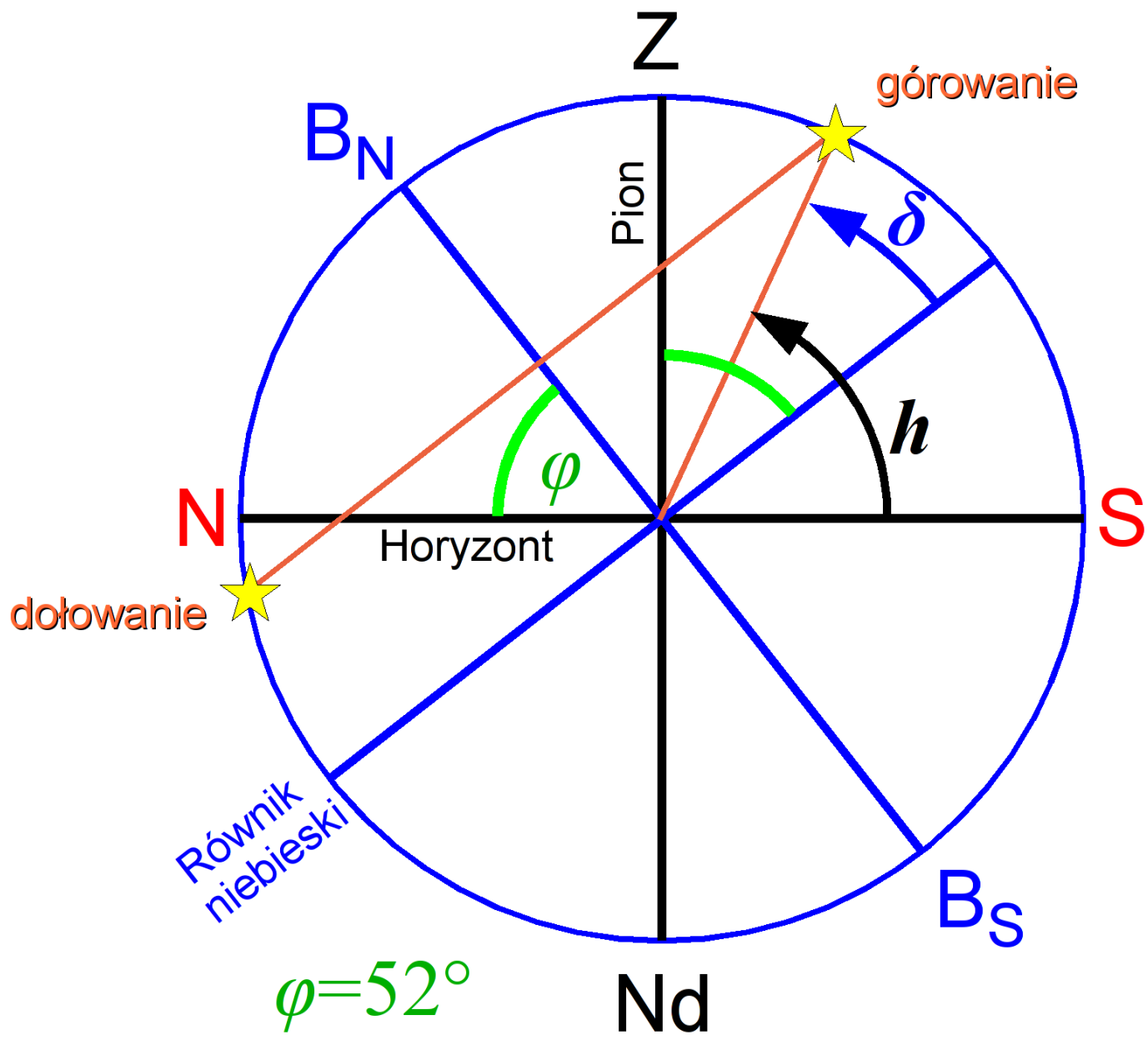
południowy
biegun świata

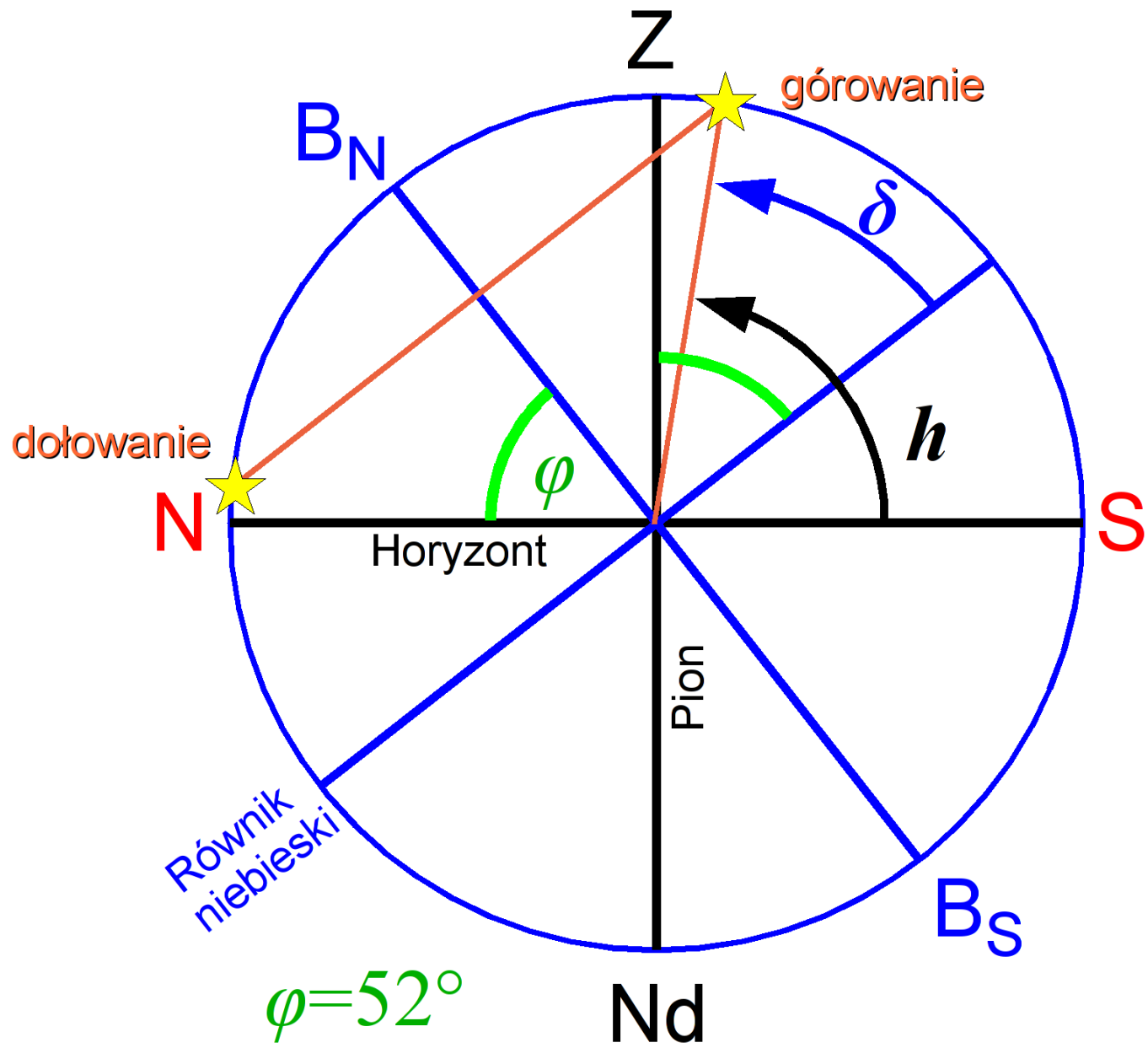
**Deklinacja
w układach równikowych**

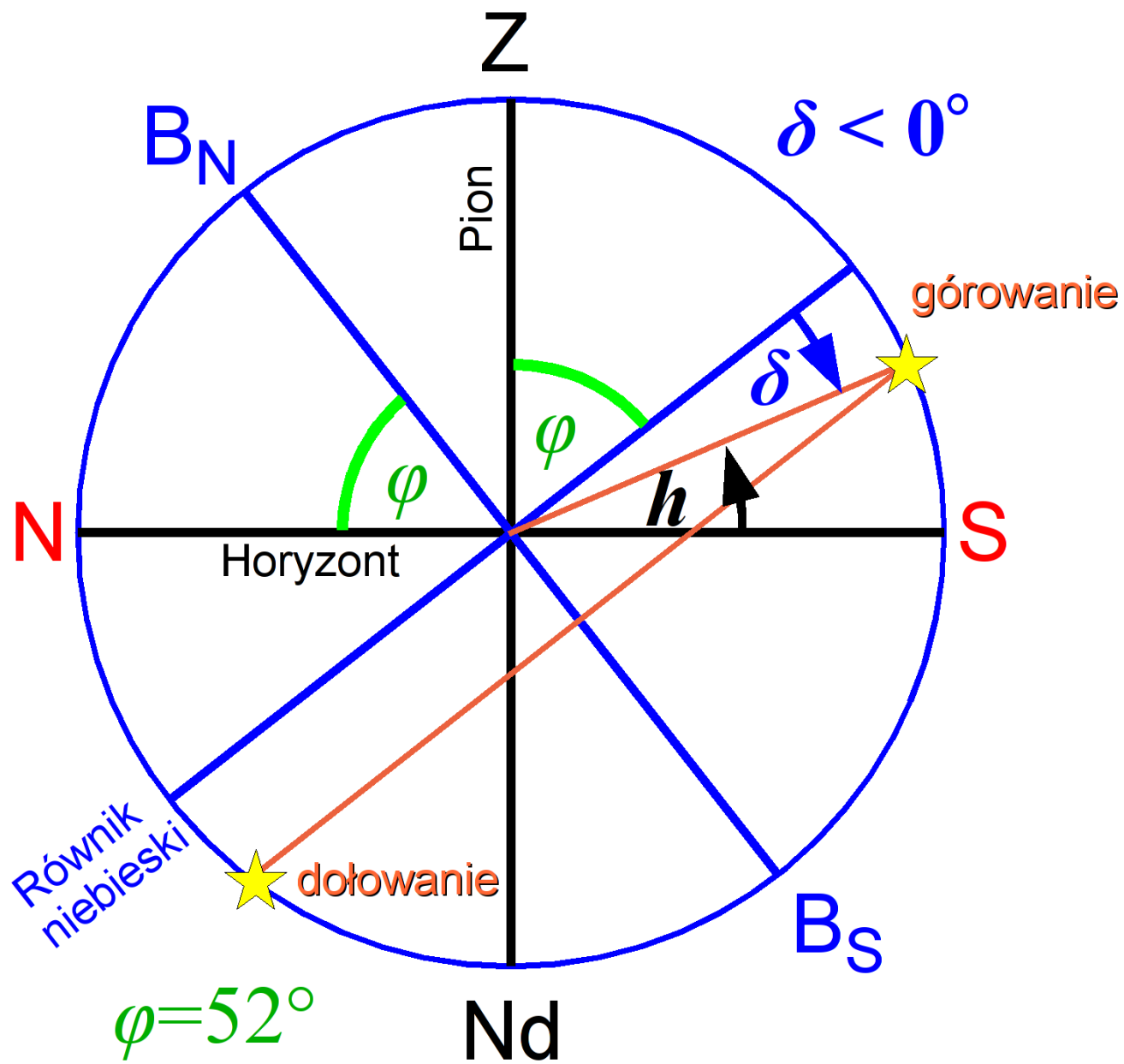


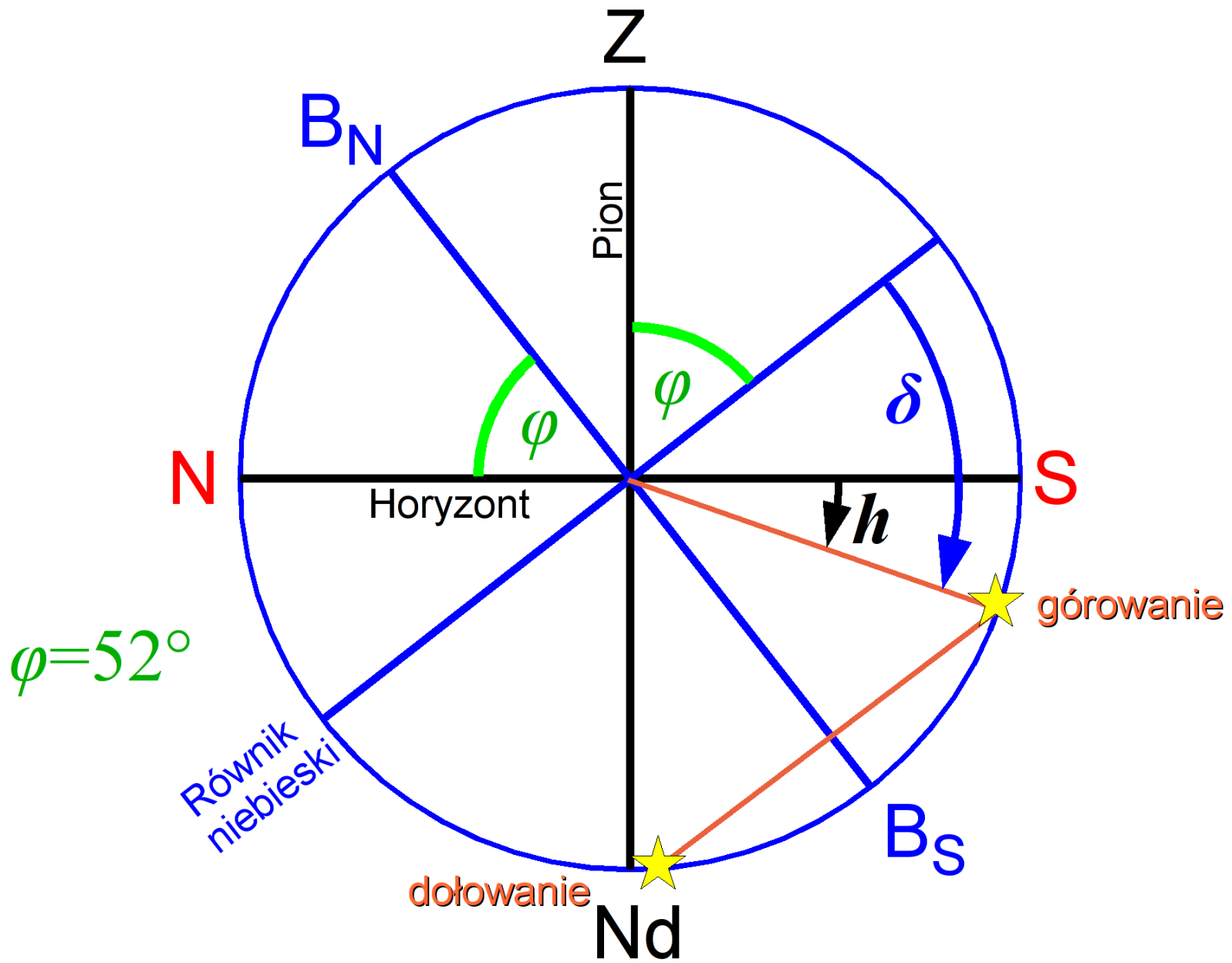












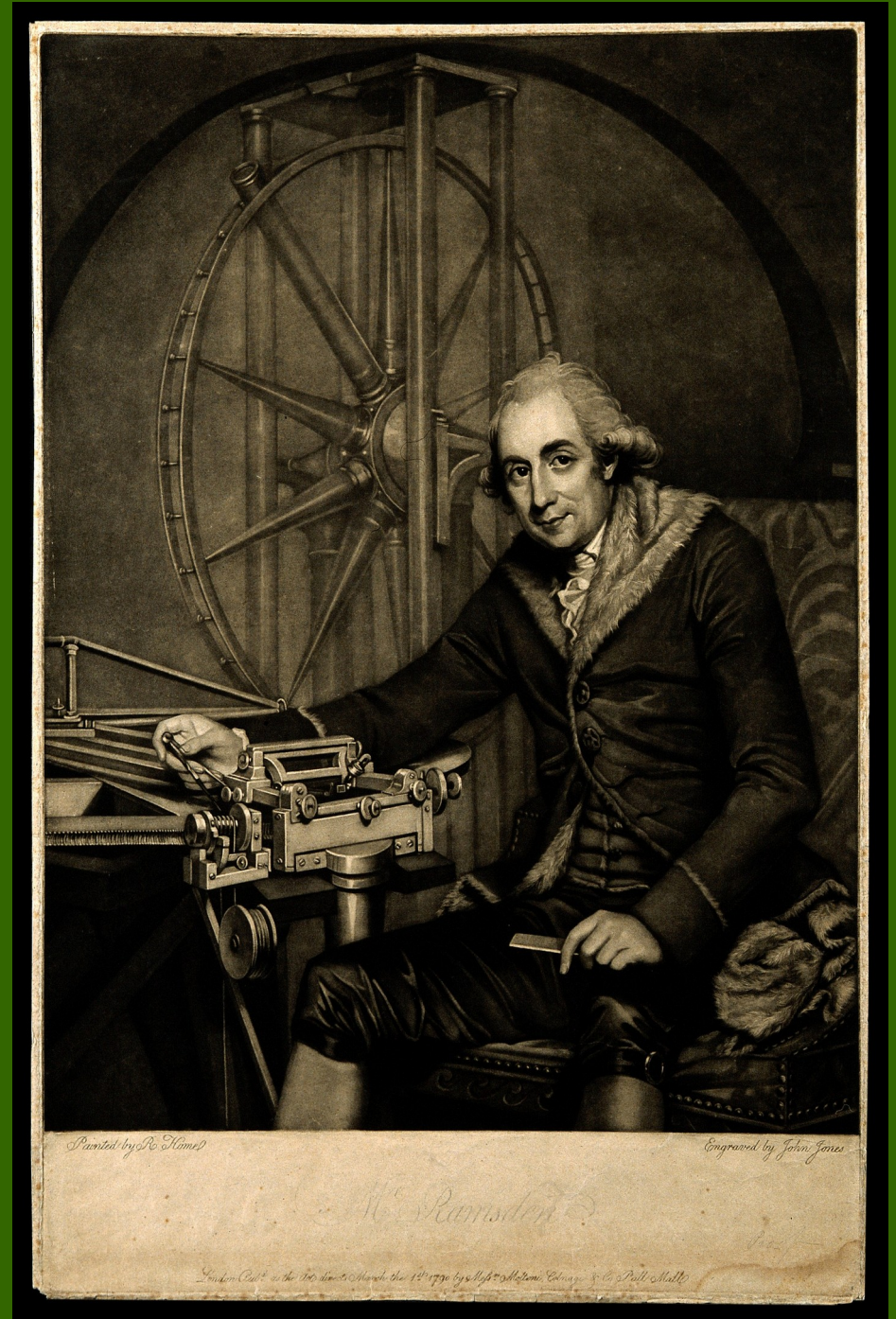
Instrumenty przejściowe i koła południkowe

**Vassar College, 1865. Średnica 4 cale, ogniskowa 5 stóp
średnica kół podziałowych 30 cali.**



Fot: americanhistory.si.edu

Jessie Ramsden (1735-1800)

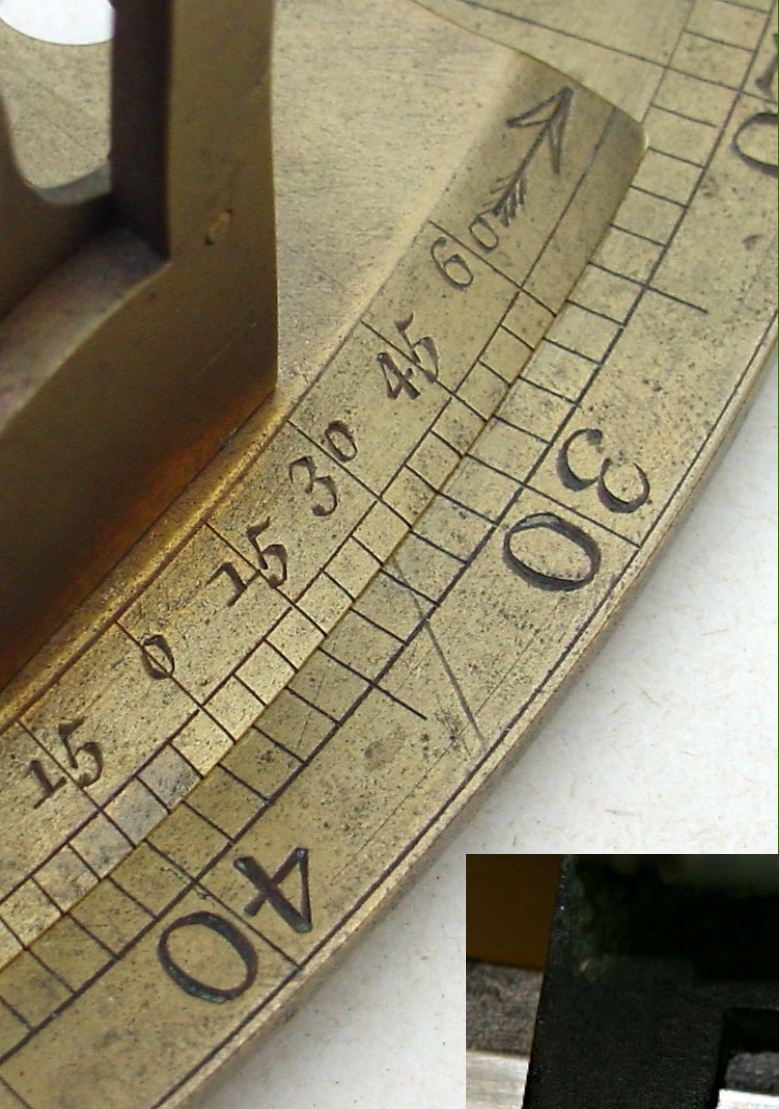


Mezzotint by J. Jones, 1790

Maszyna Ramsdena do nacinania kół podziałowych



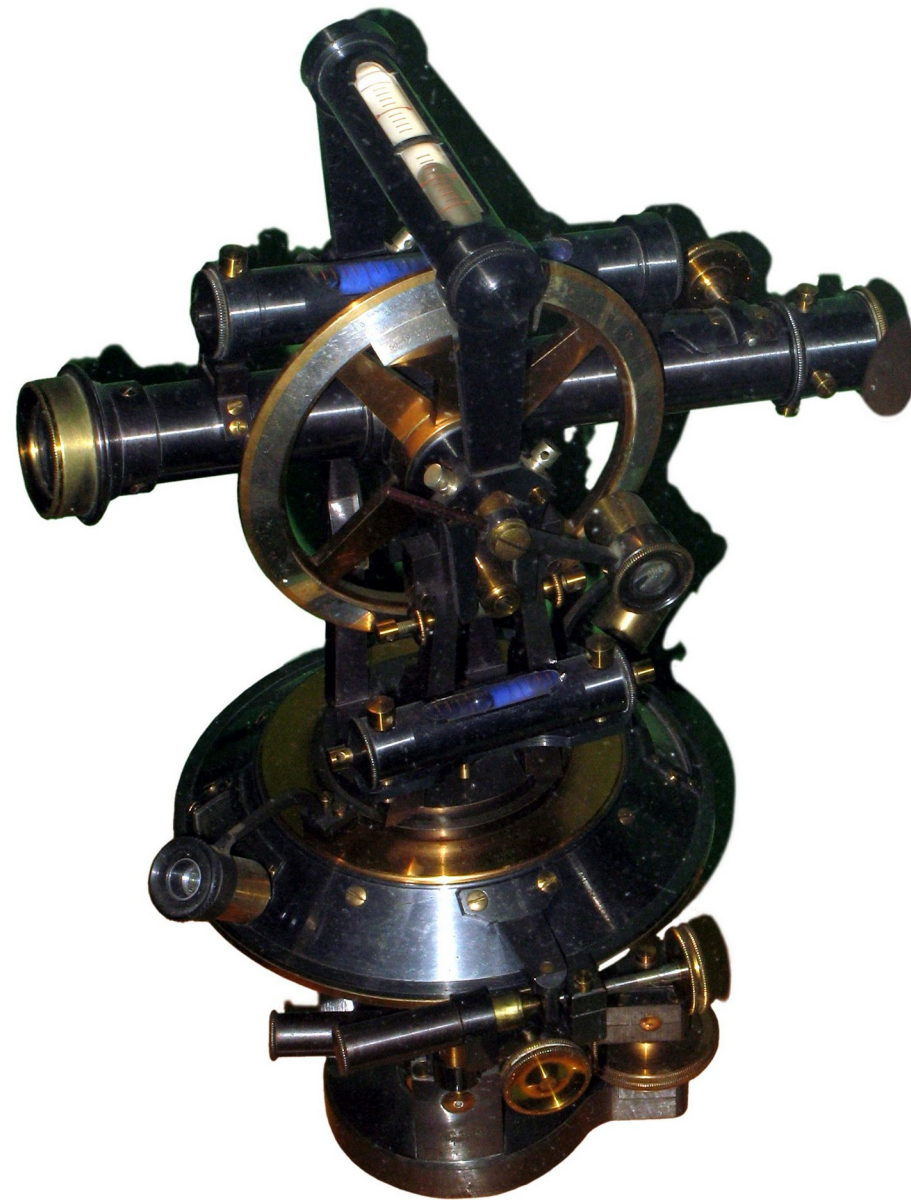
Sześć obrotów korbki
to obrót stołu o jeden stopień.



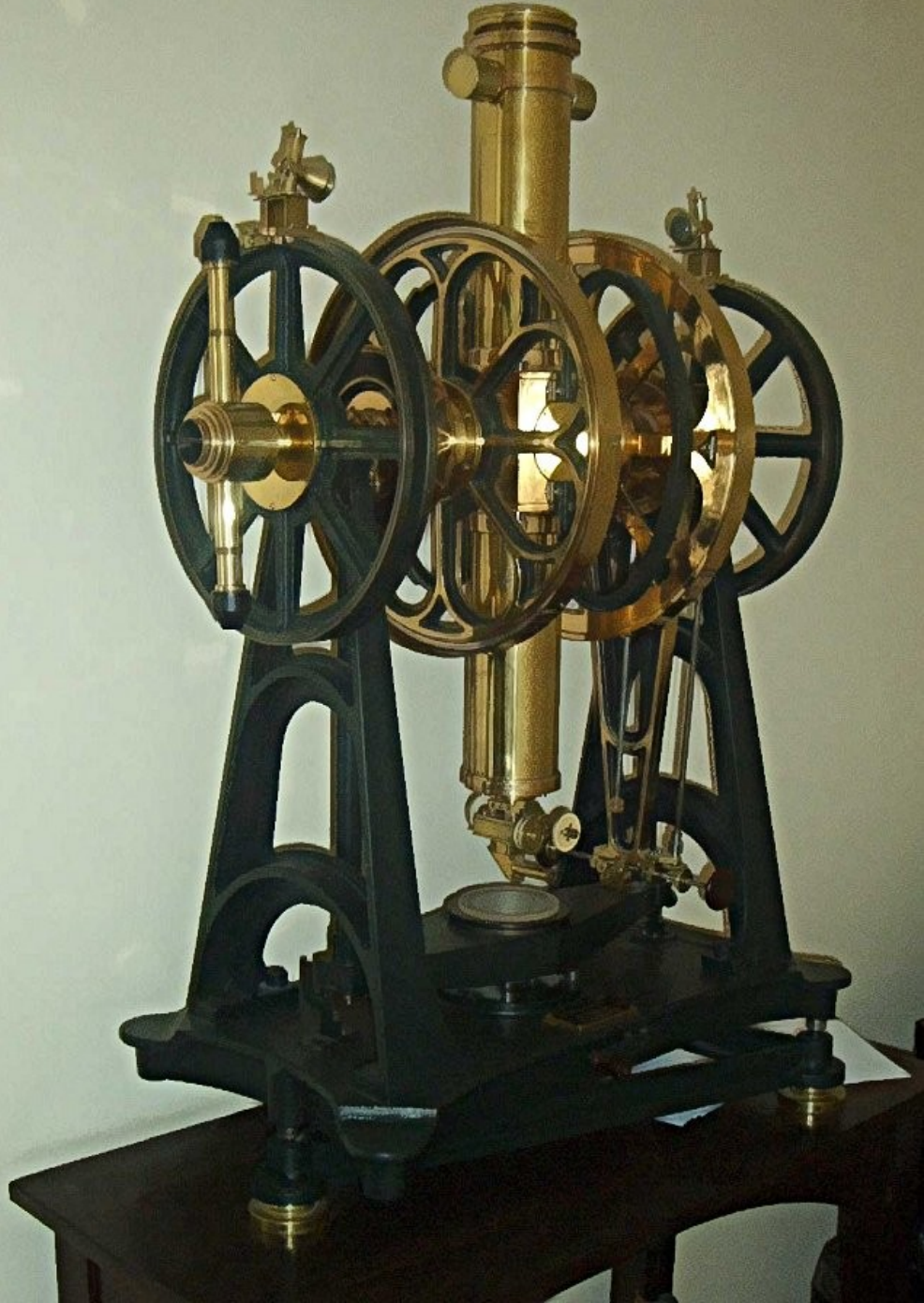
www.etesseract.com

www.dehilster.info





by: Rama

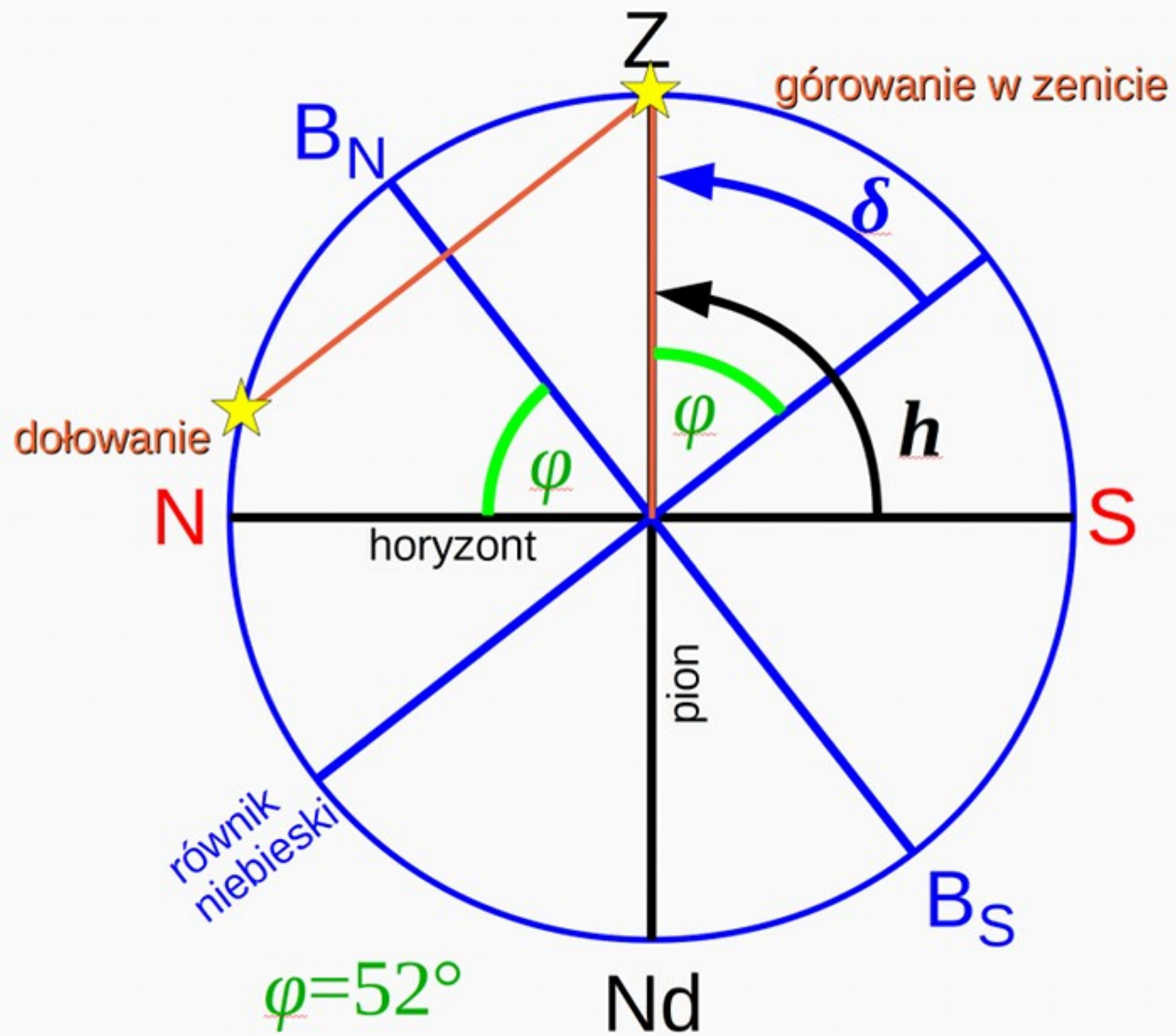


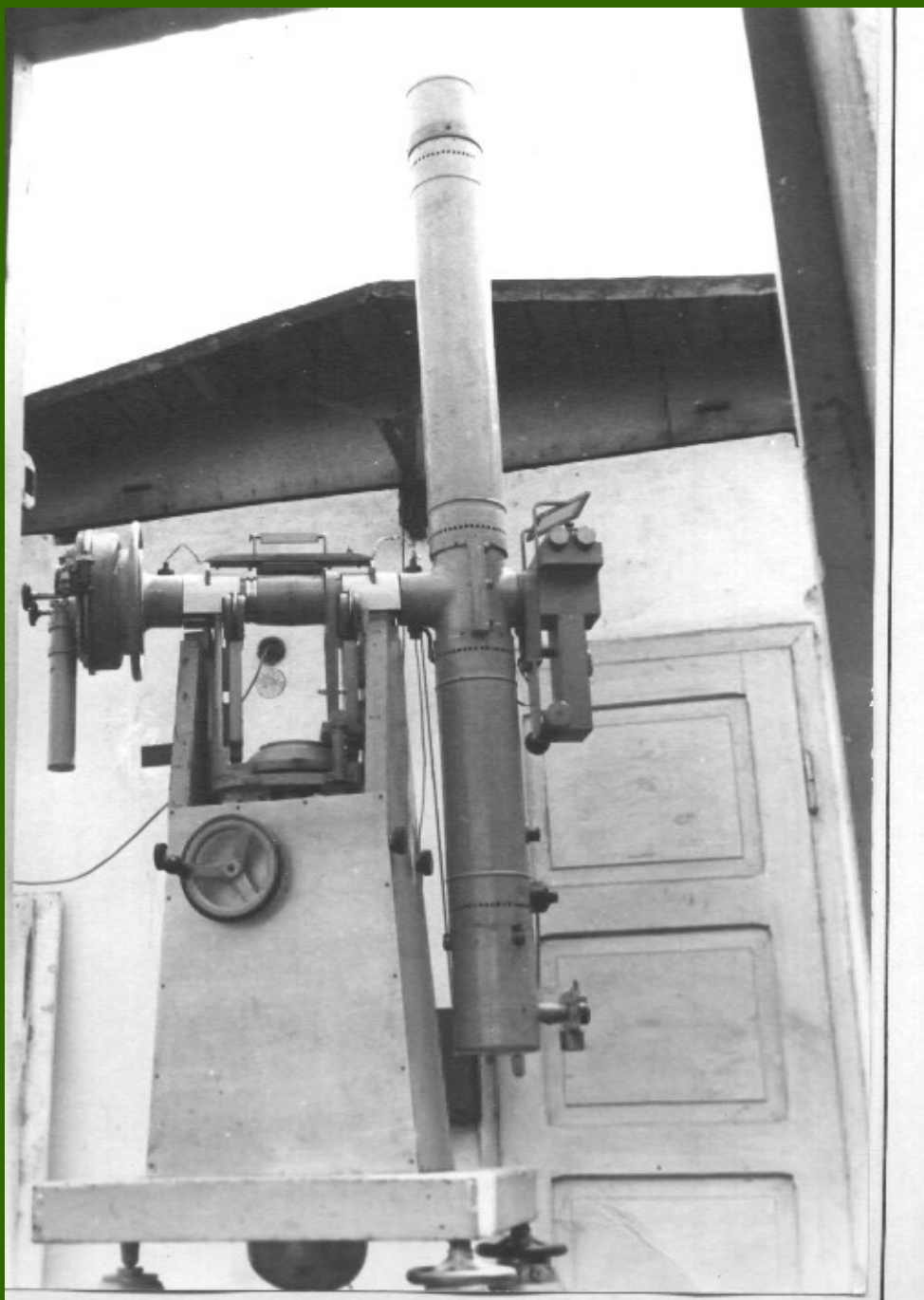
**Instrument
przejściowy
obserwatorium
poznańskiego.**

Ostania obserwacja 1 września 2013



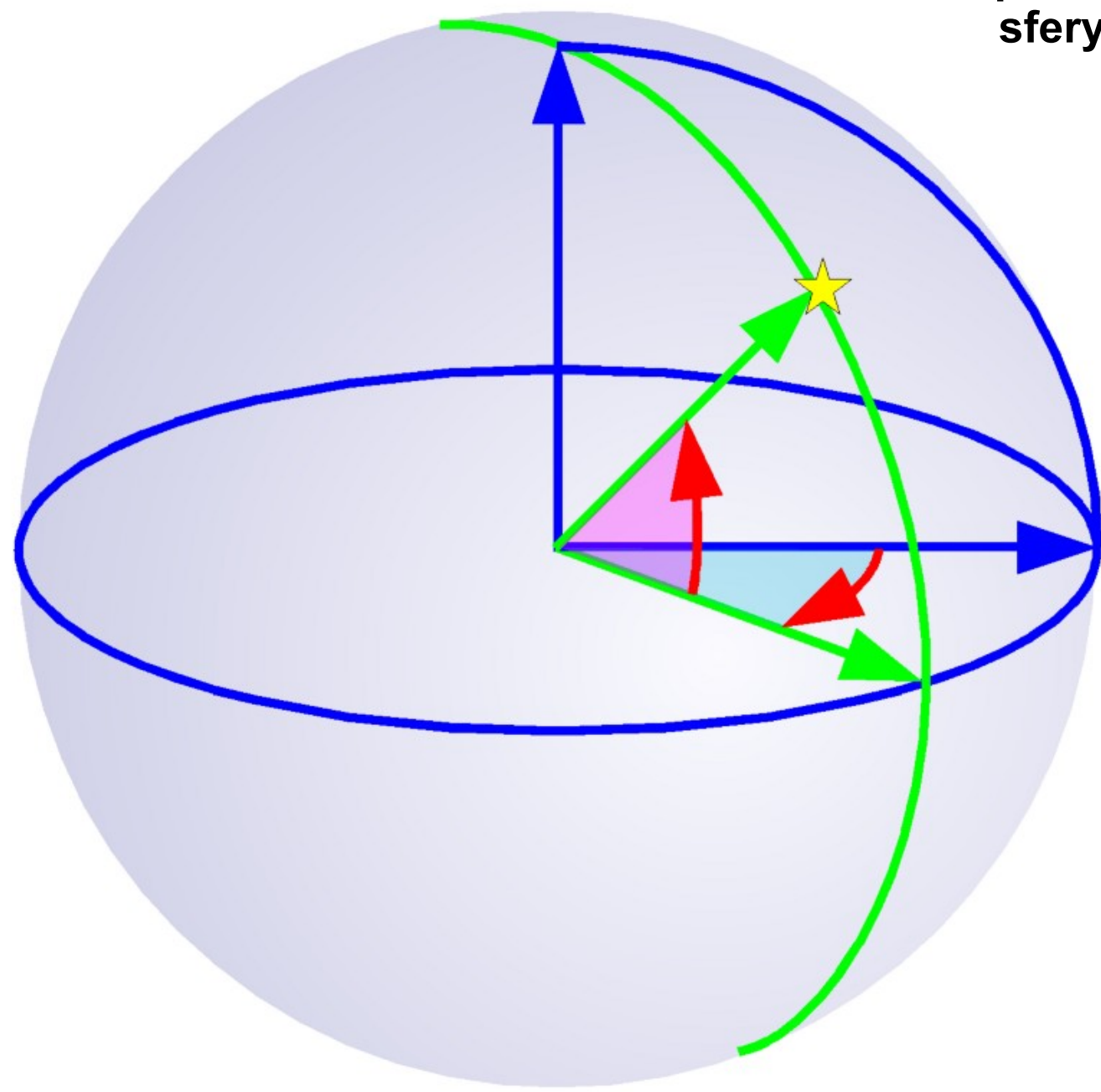
**Carlsberg Meridian Telescope
picture taken by Dafydd Wyn Evans.**

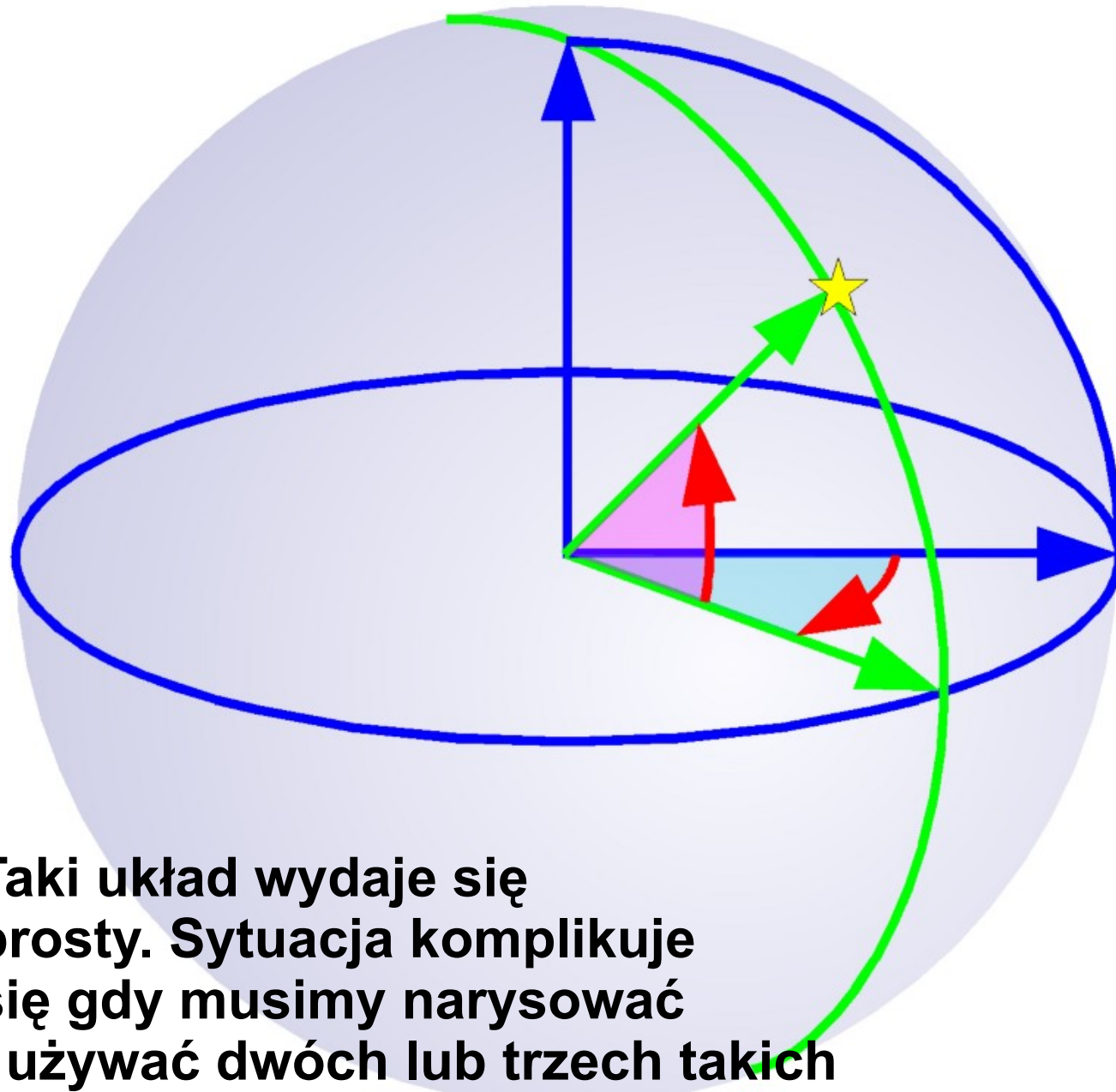




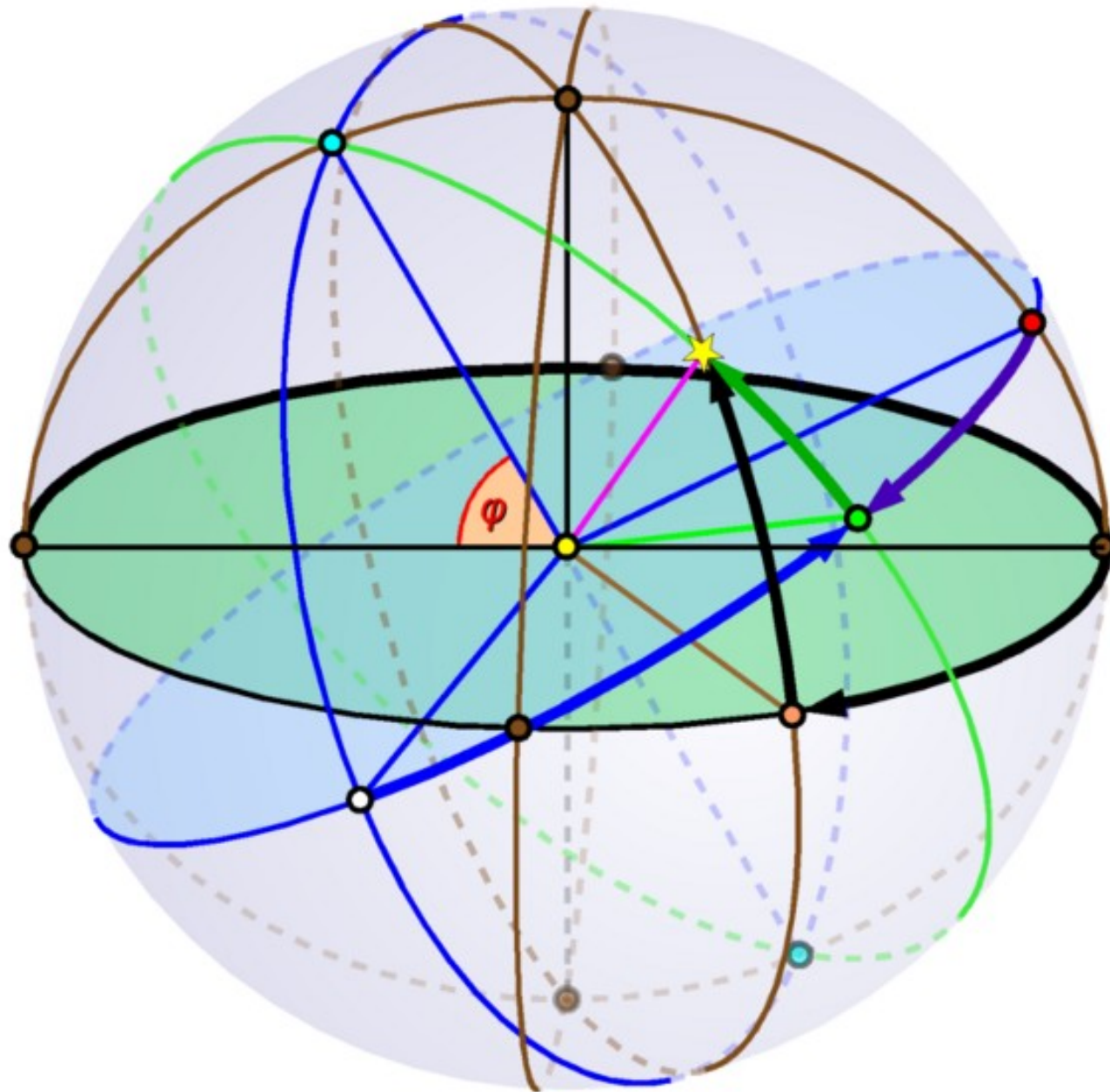
Teleskop zenitalny obserwatorium poznańskiego

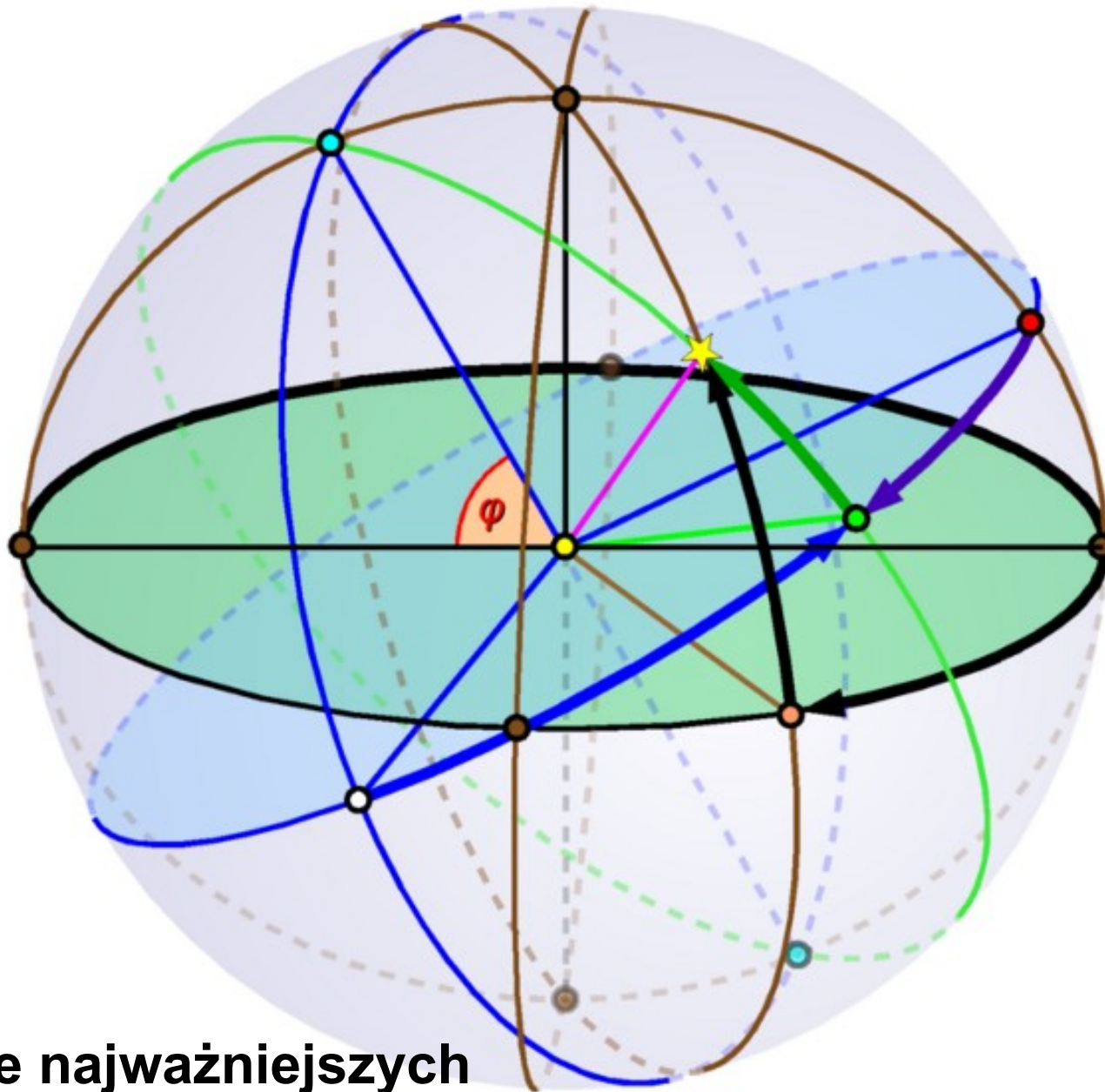
Układ współrzędnych sferycznych



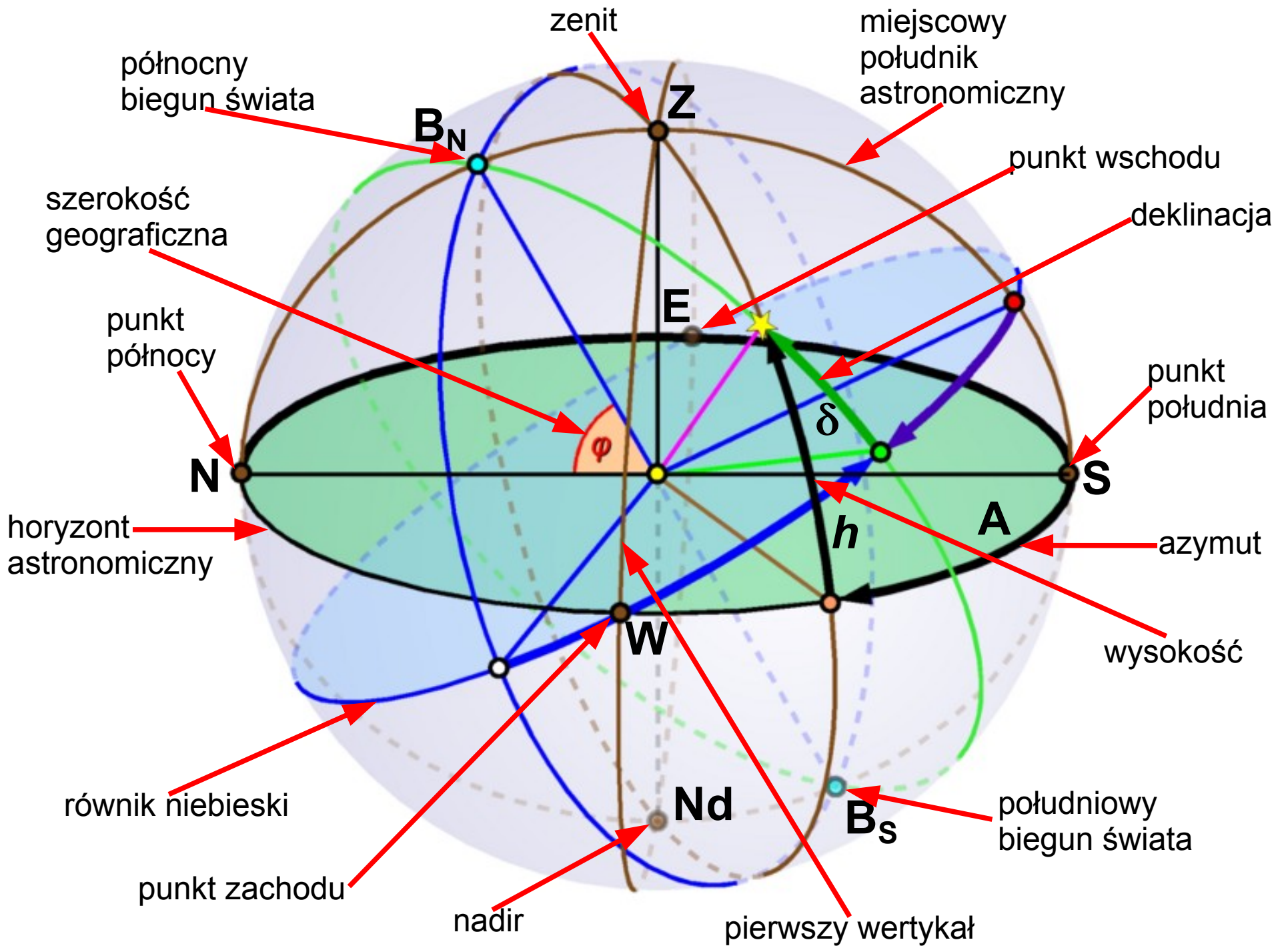


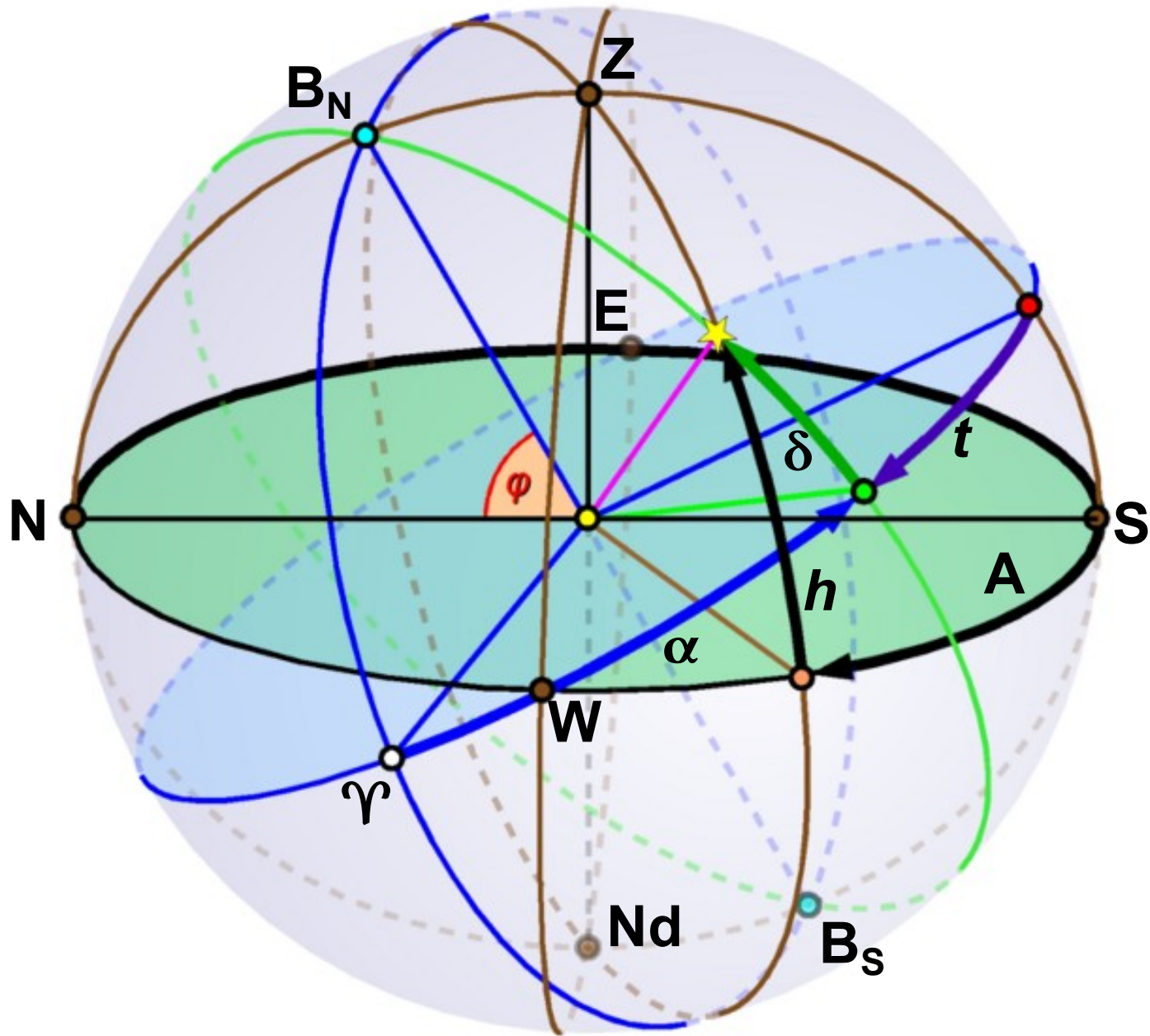
Taki układ wydaje się prosty. Sytuacja komplikuje się gdy musimy narysować i używać dwóch lub trzech takich układów jednocześnie...

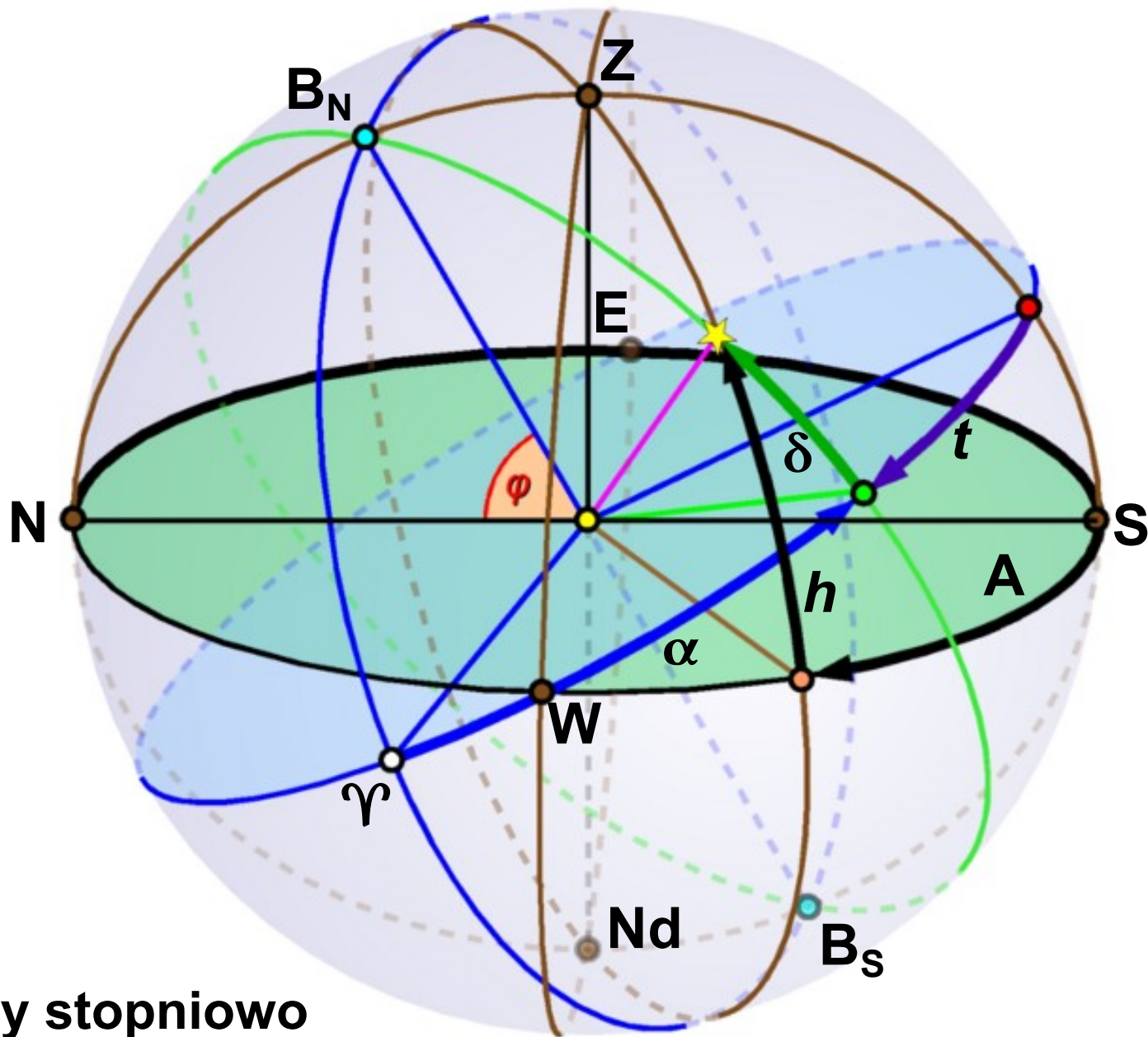




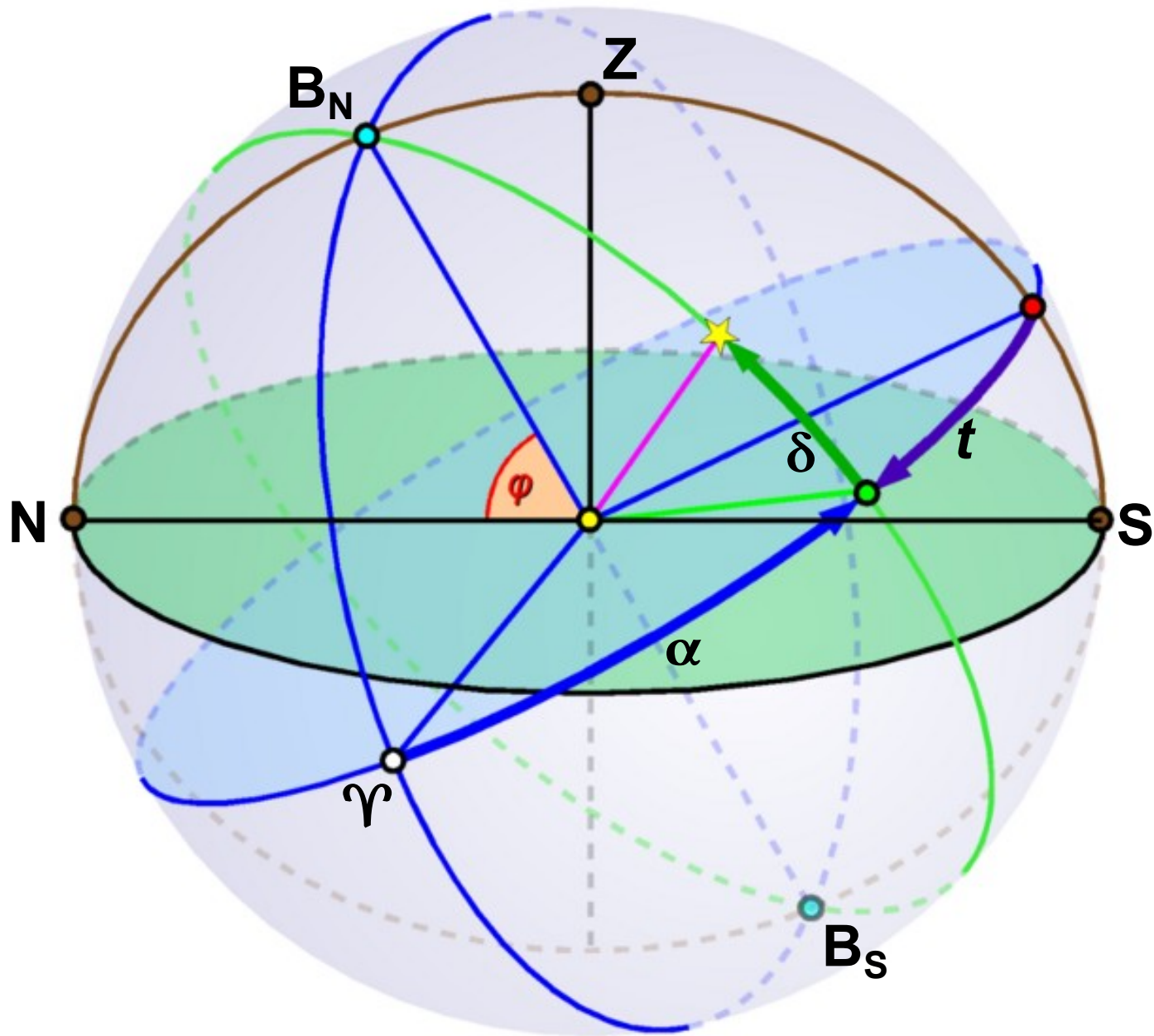
Oznaczenie najważniejszych punktów i kątów niewiele pomoże...

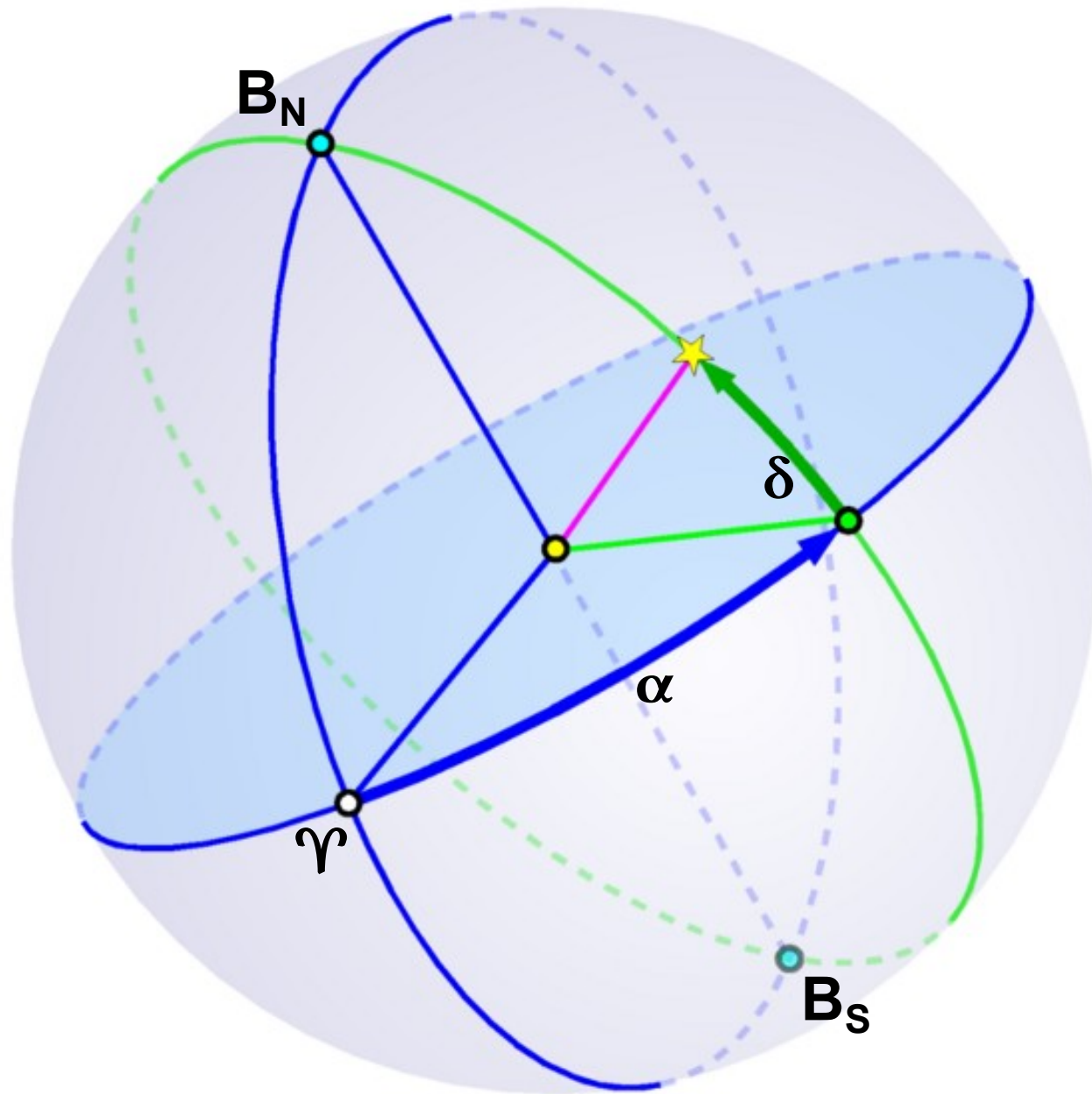


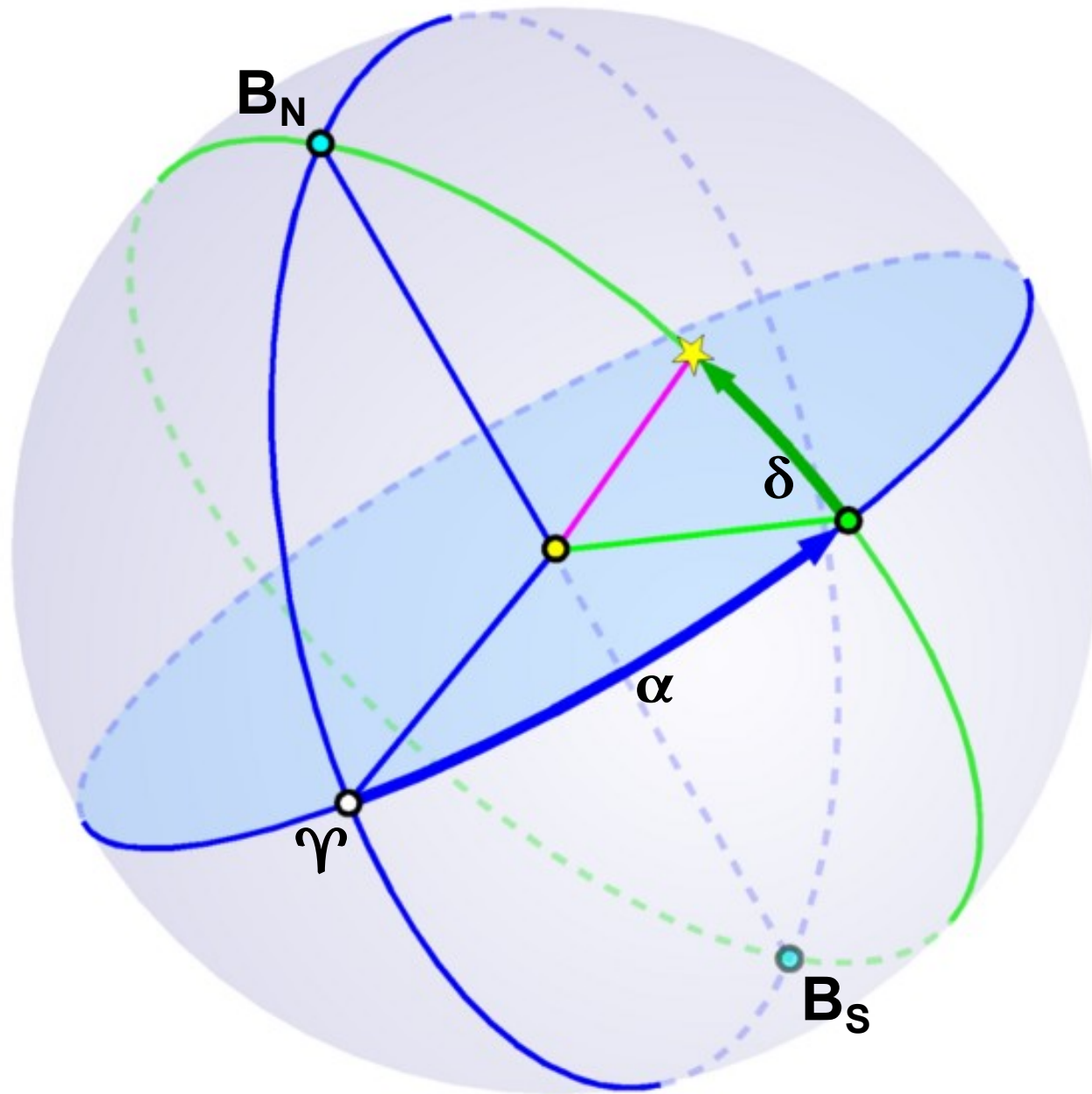




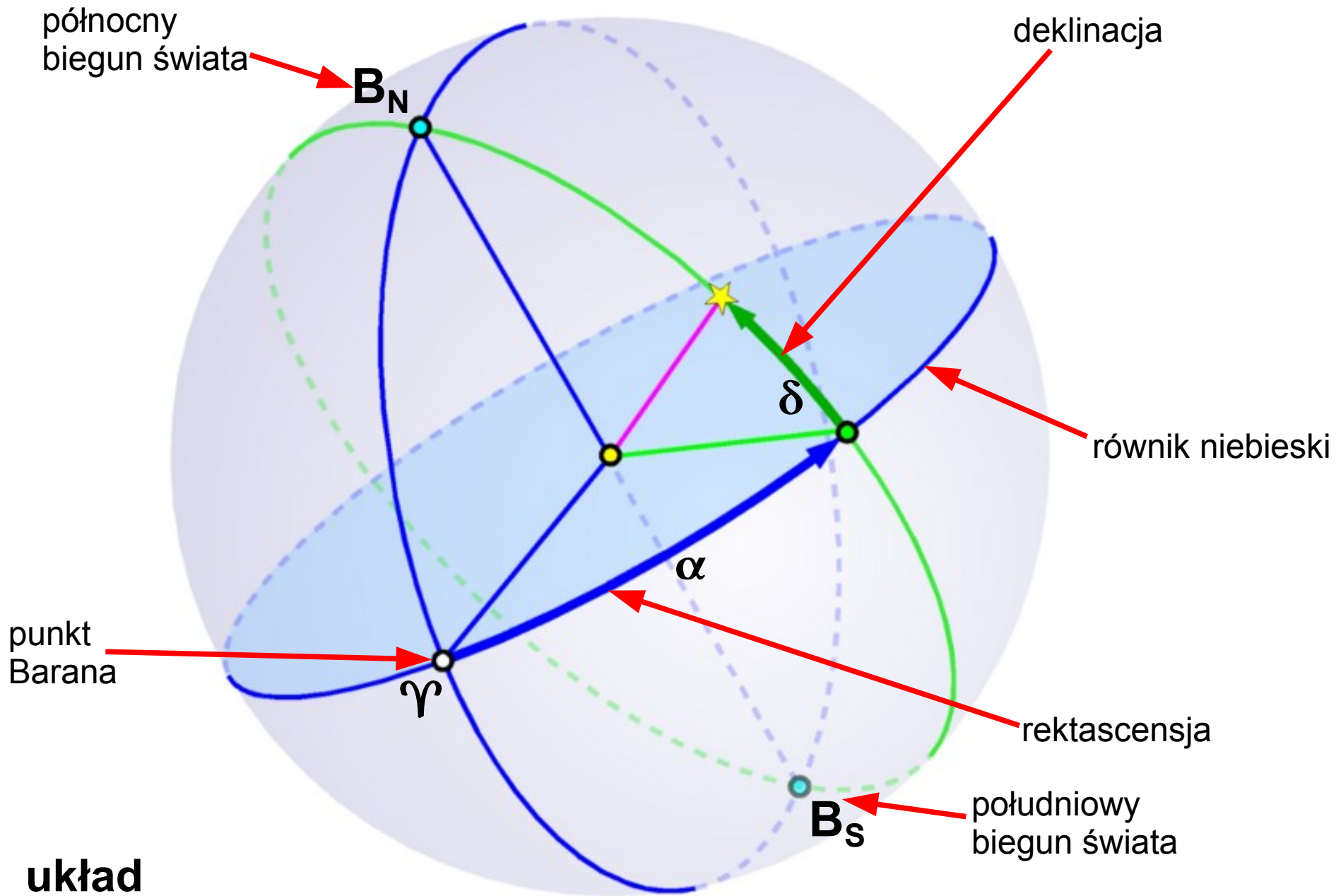
Usuwamy stopniowo
elementy układu horyzontalnego...



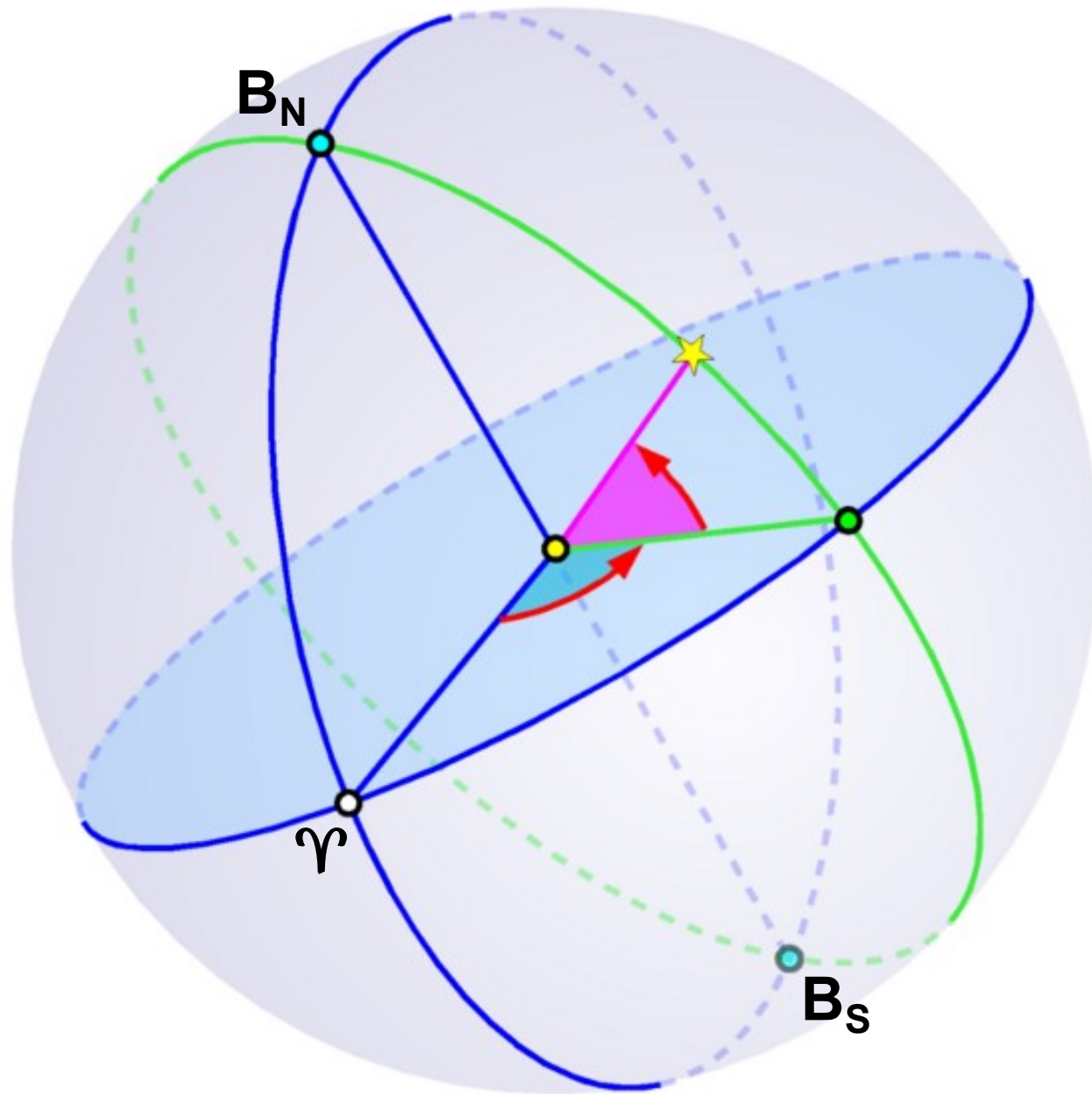


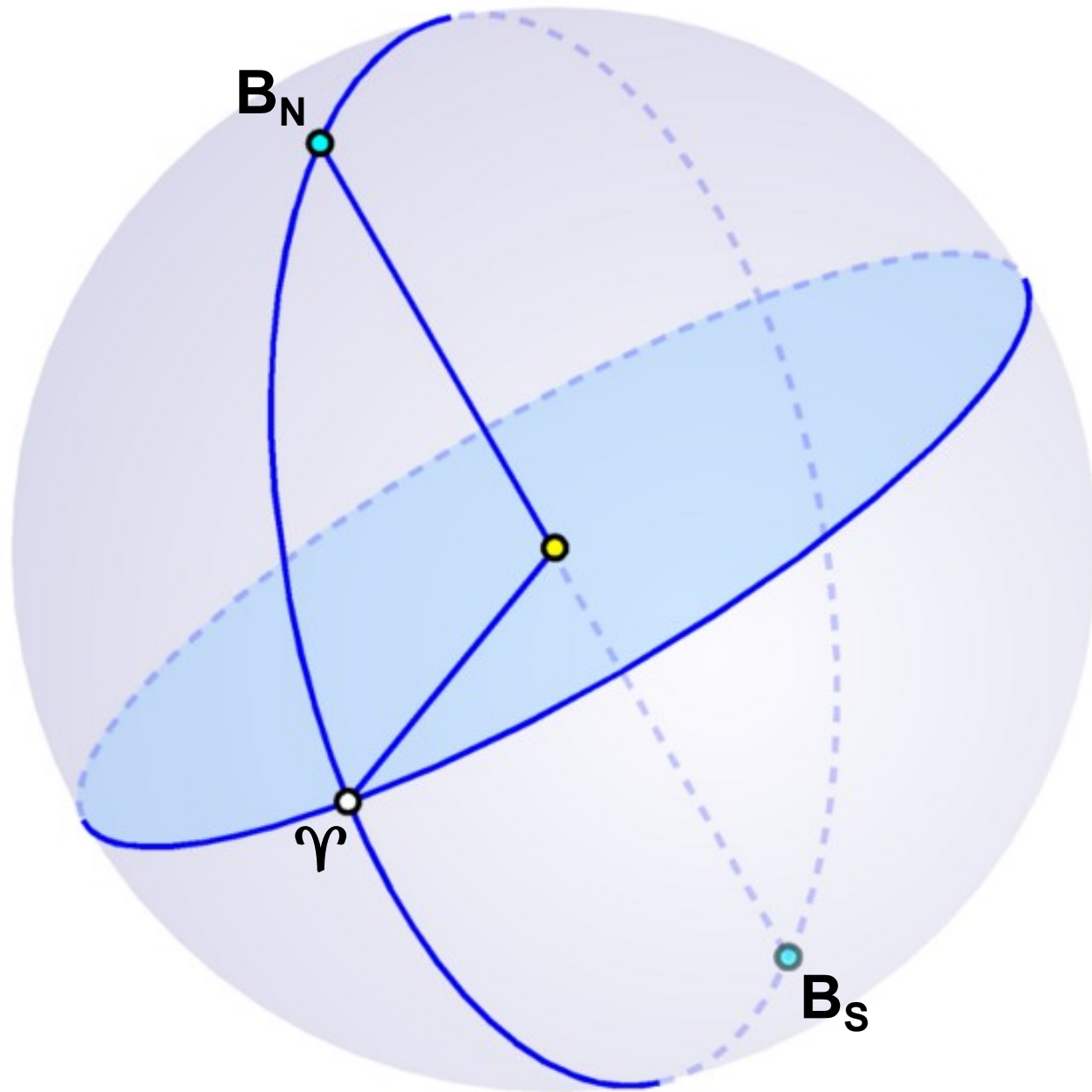


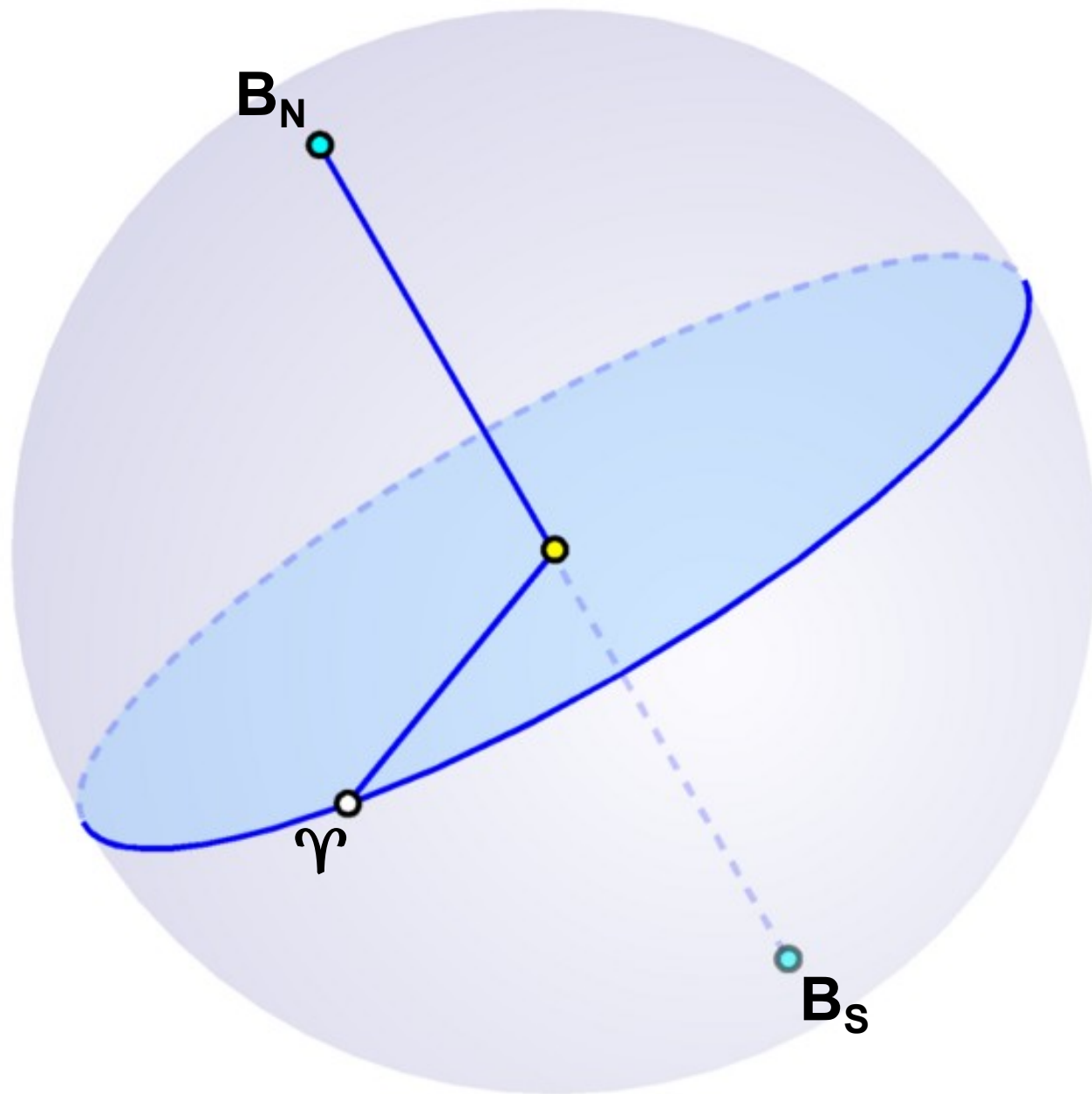
Oto układ
równikowy równonocny...

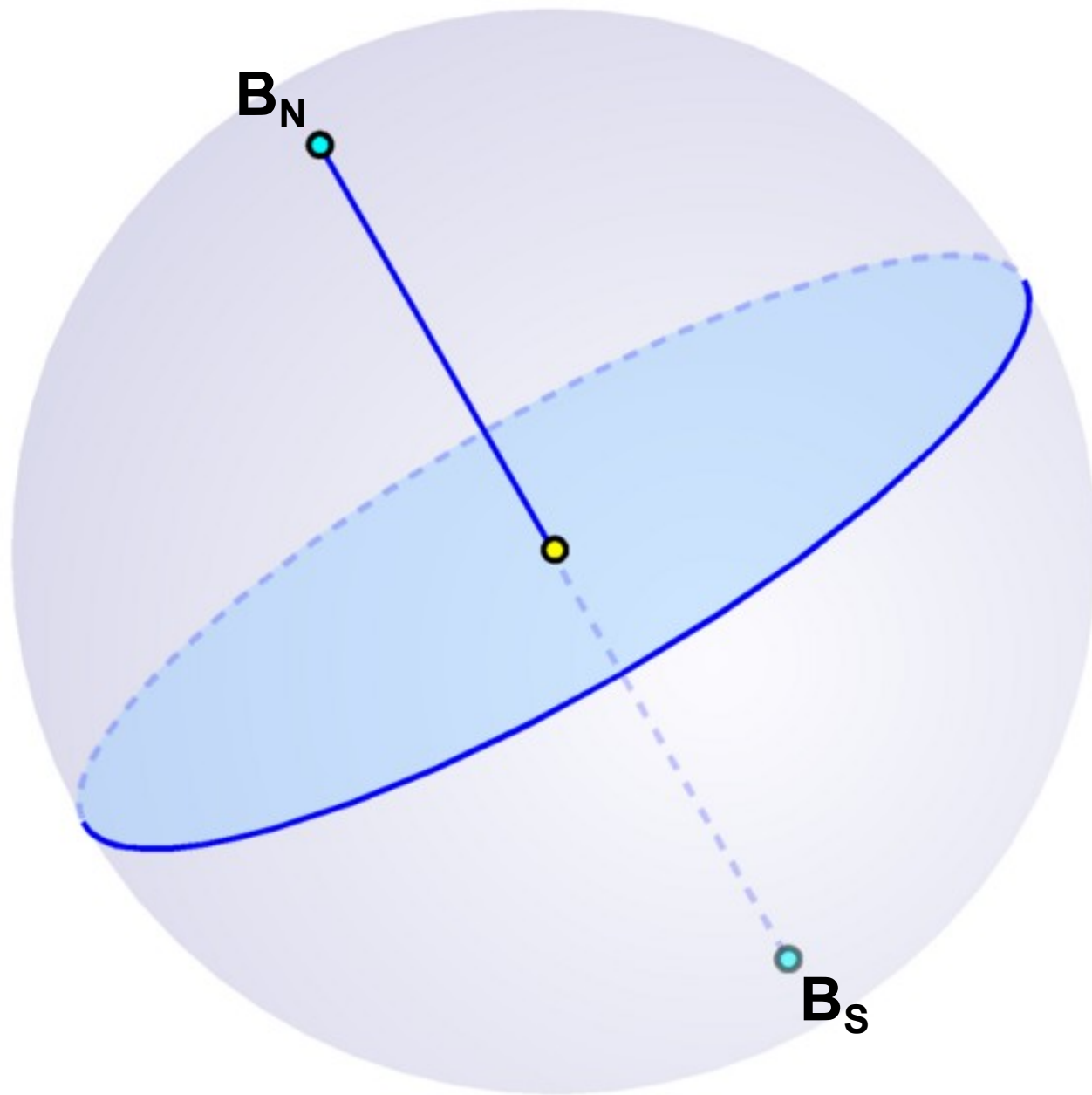


Oto układ
równikowy równonocny...







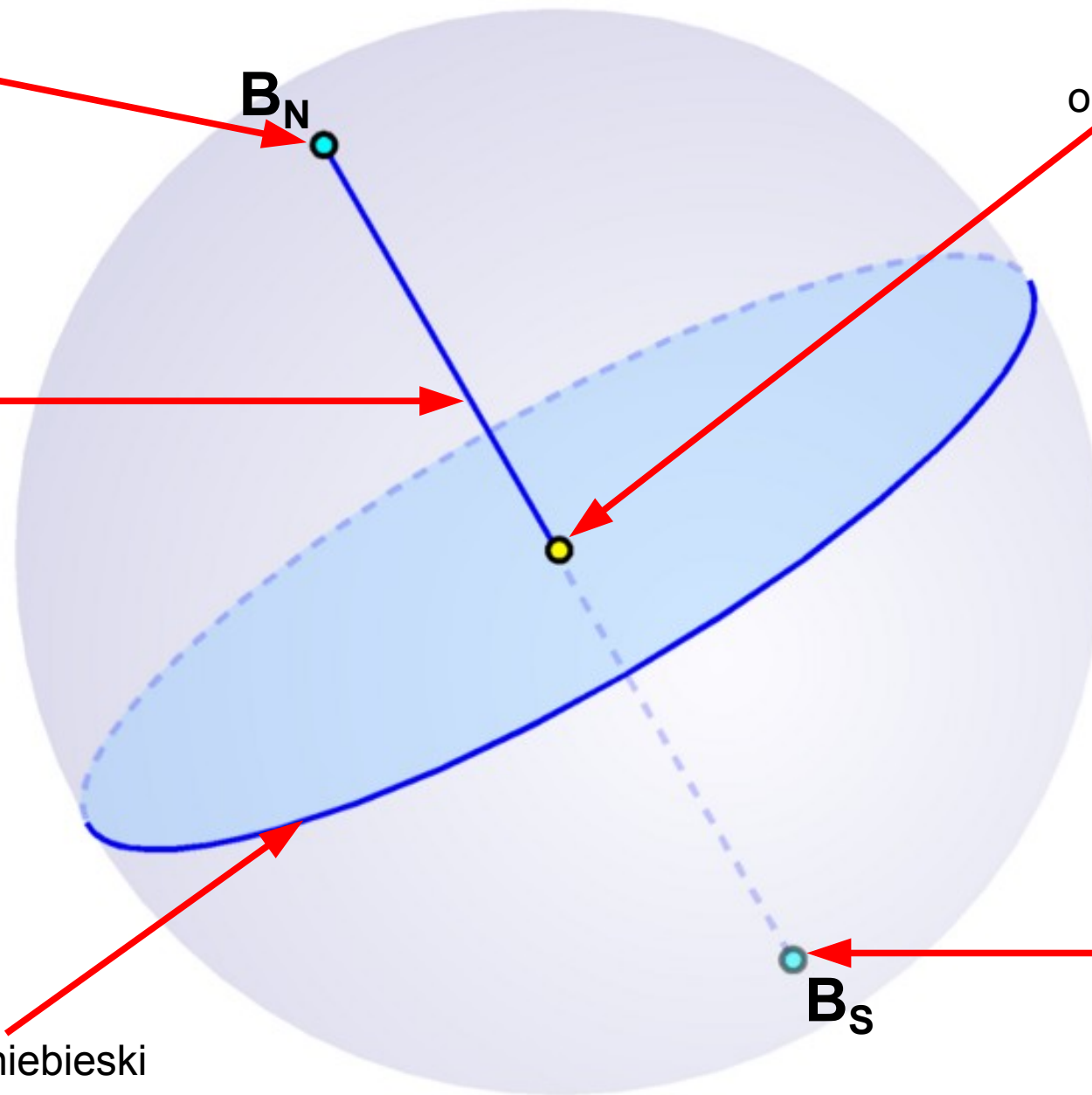


północny
biegun świata

B_N

obserwator

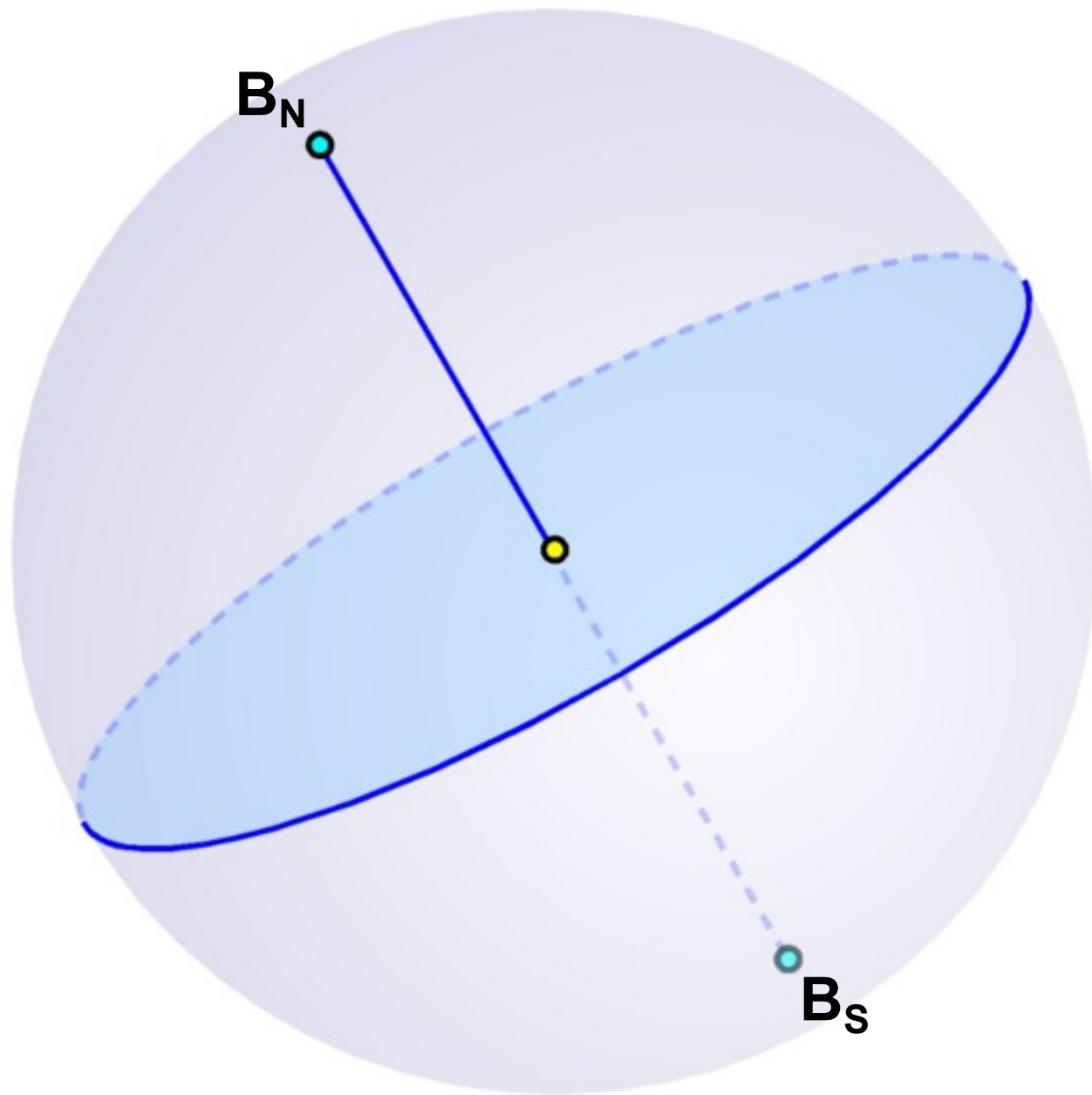
oś świata

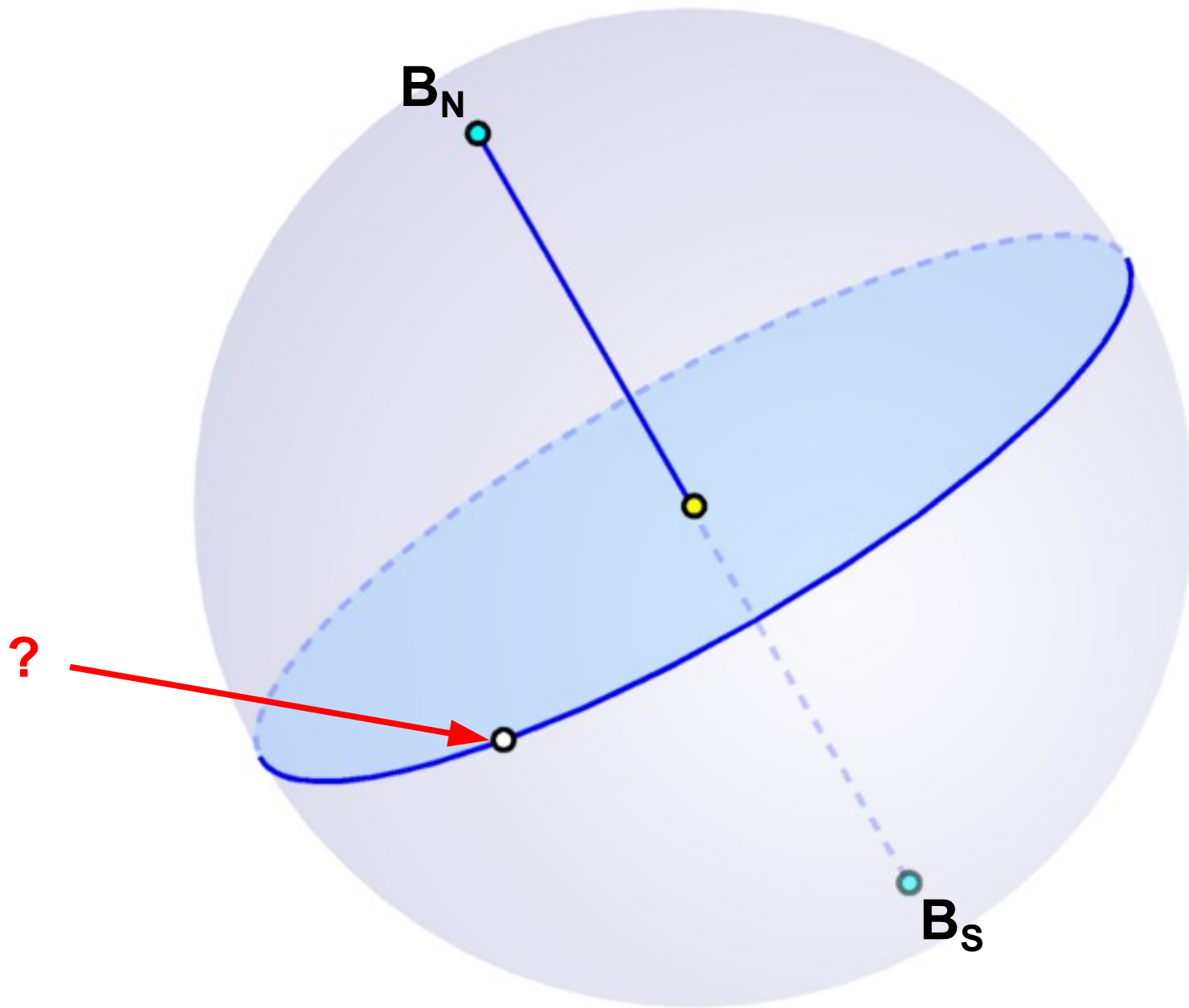


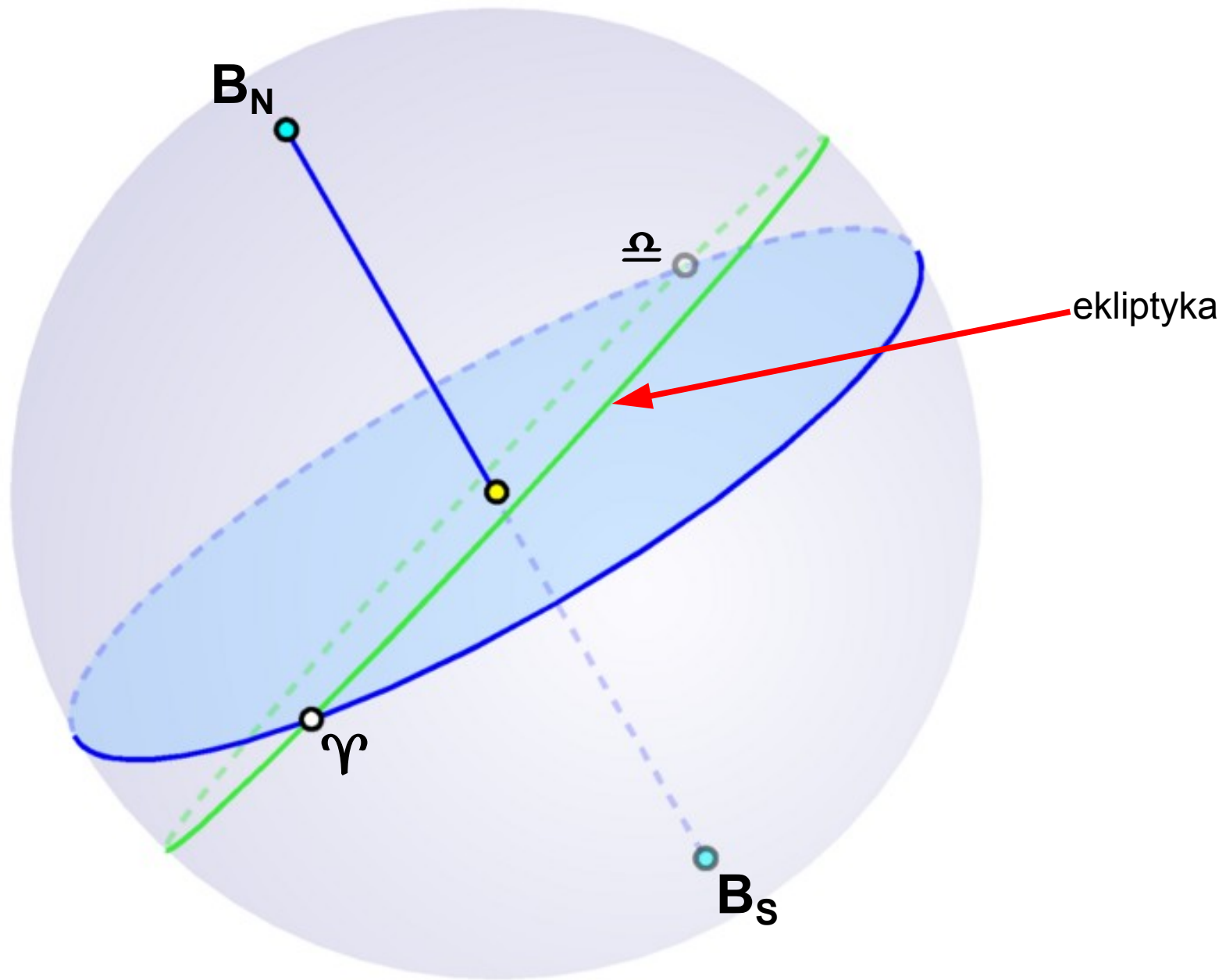
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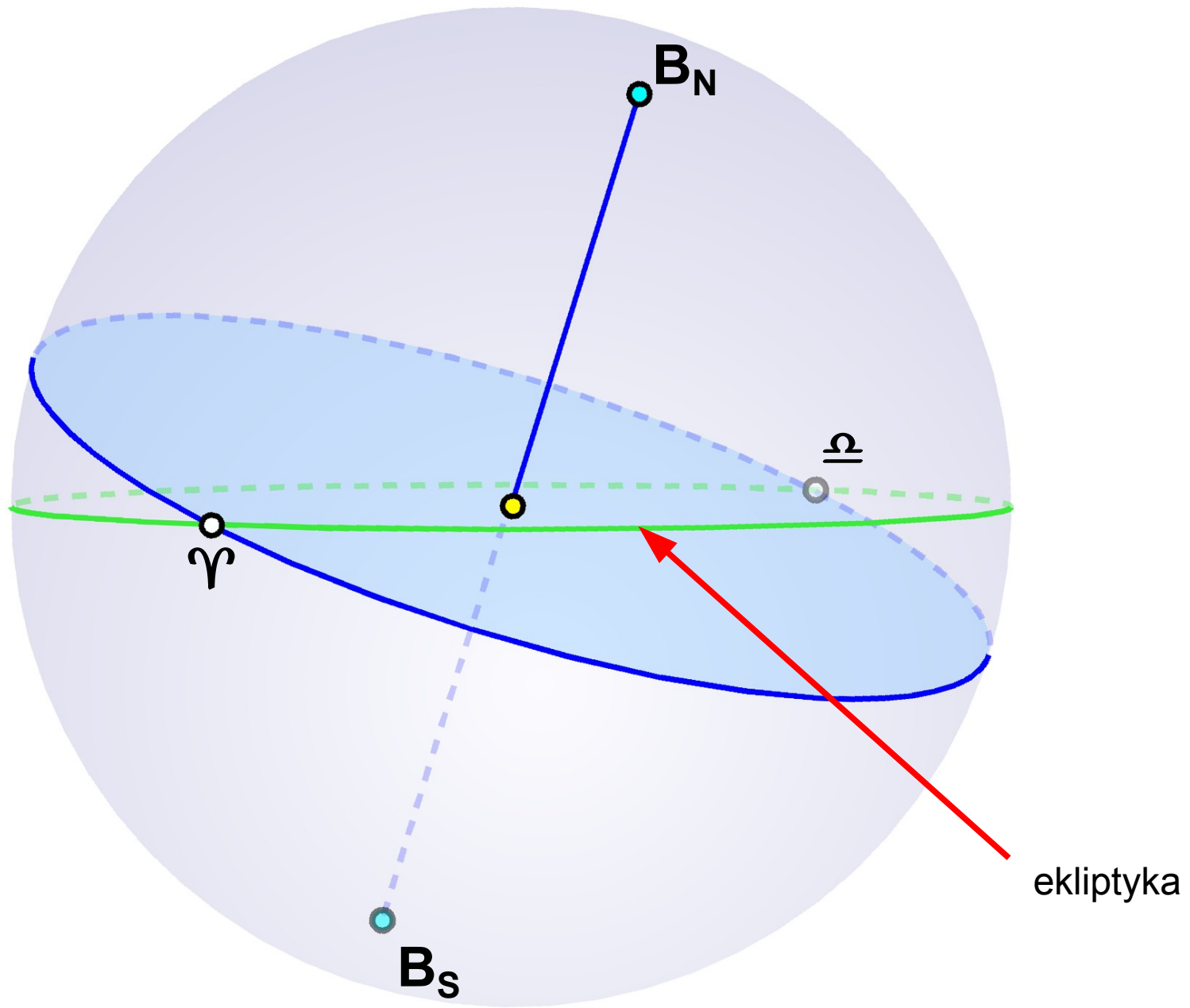
południowy
biegun świata

B_S



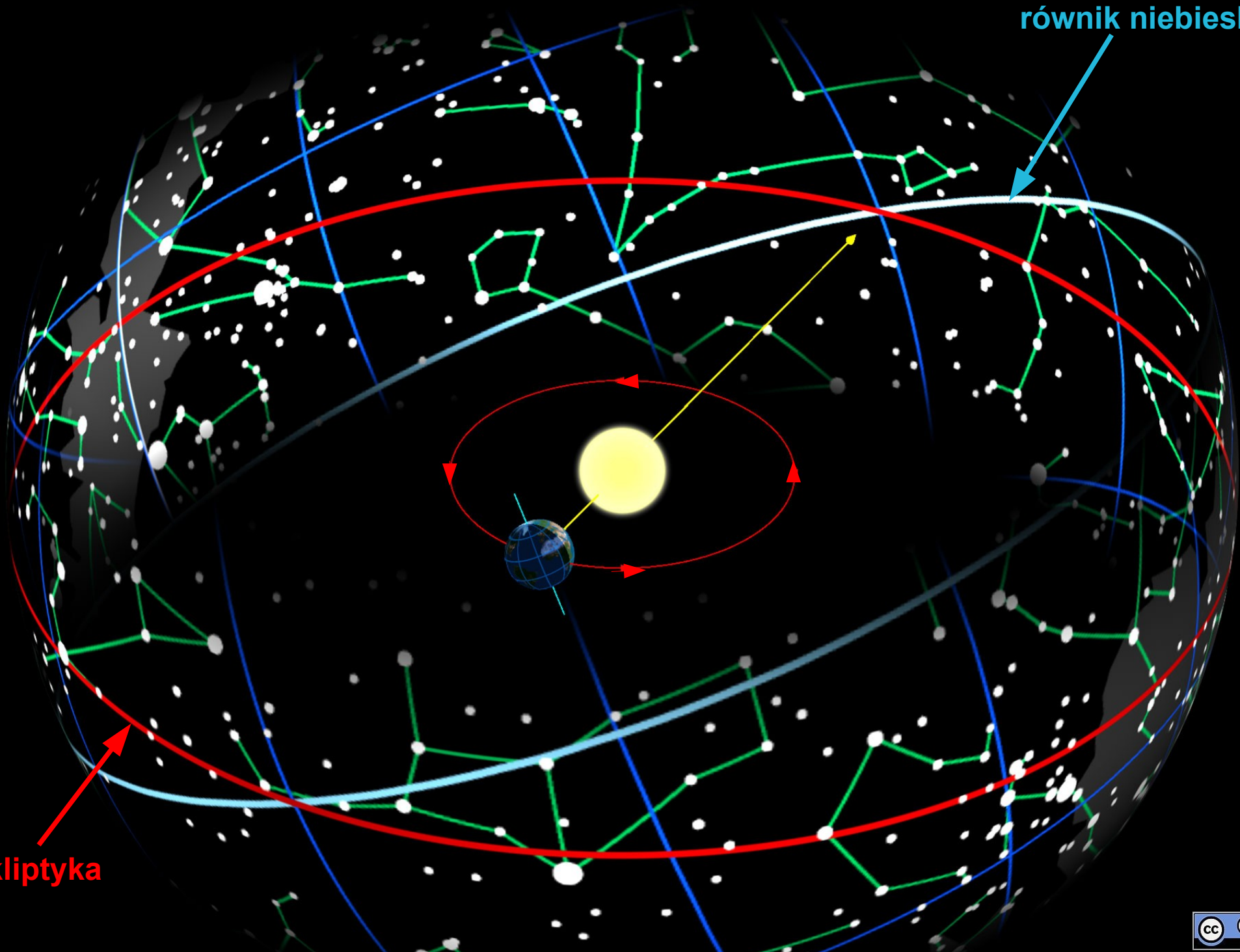




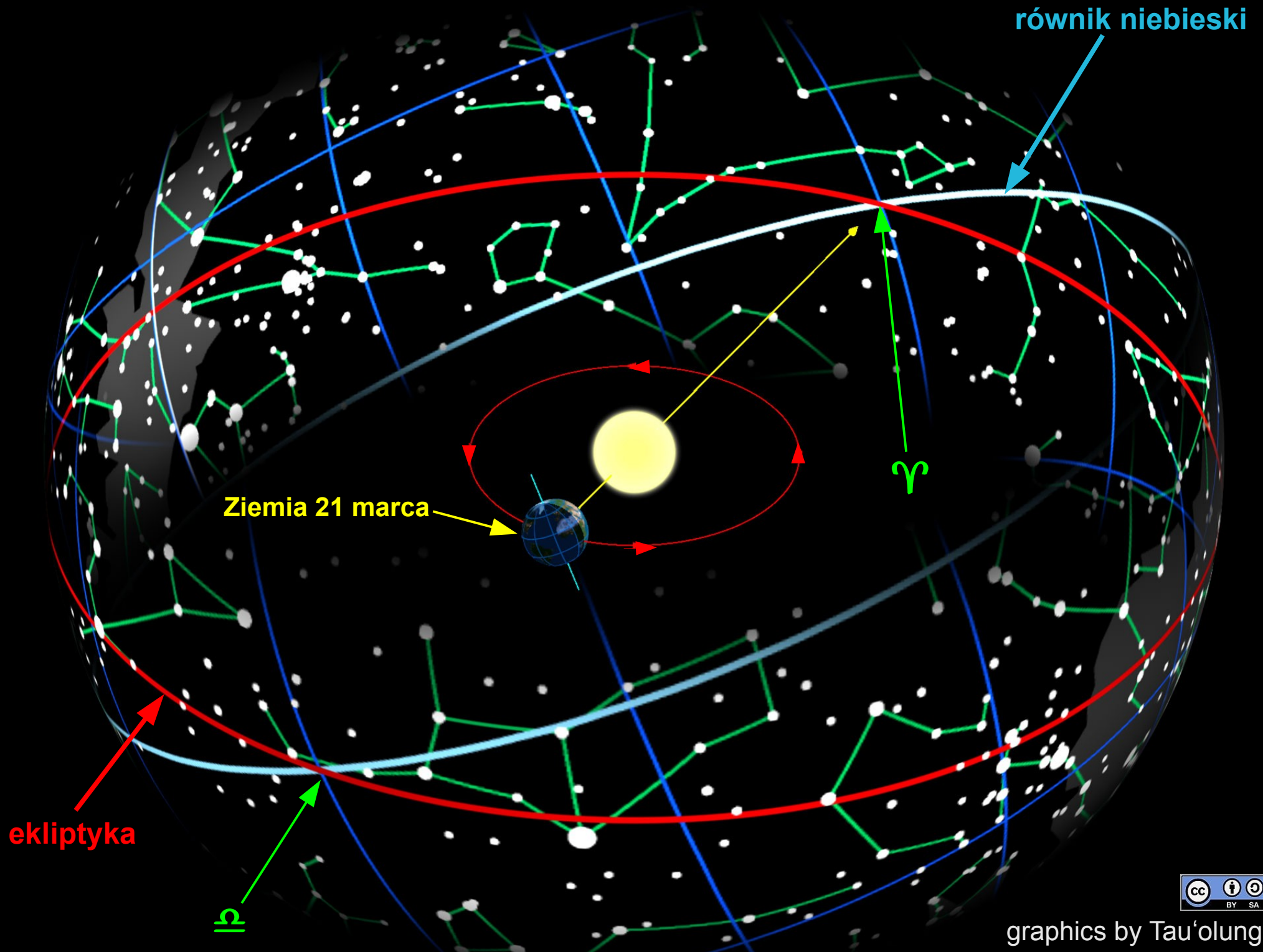


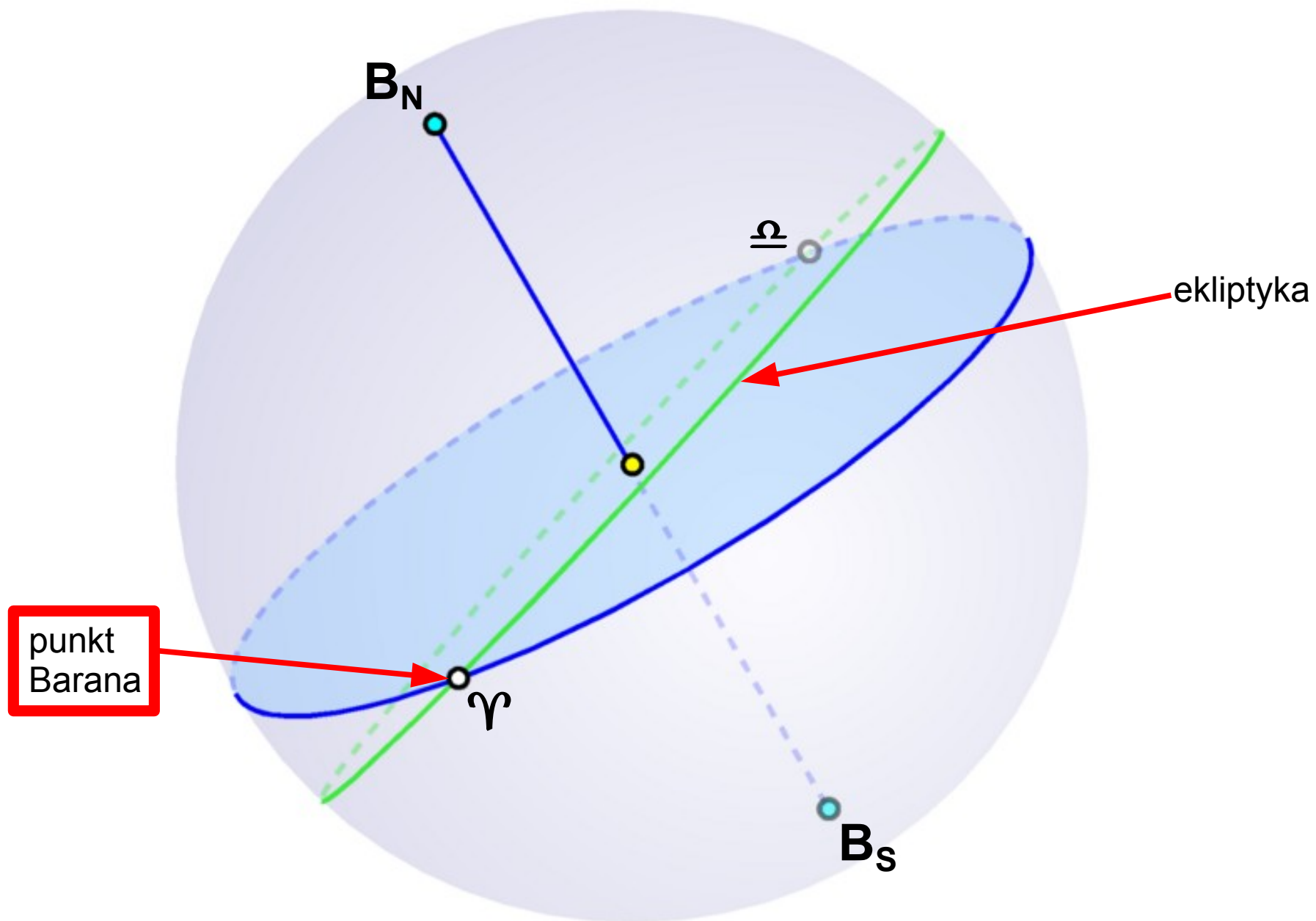
równik niebieski

ekliptyka



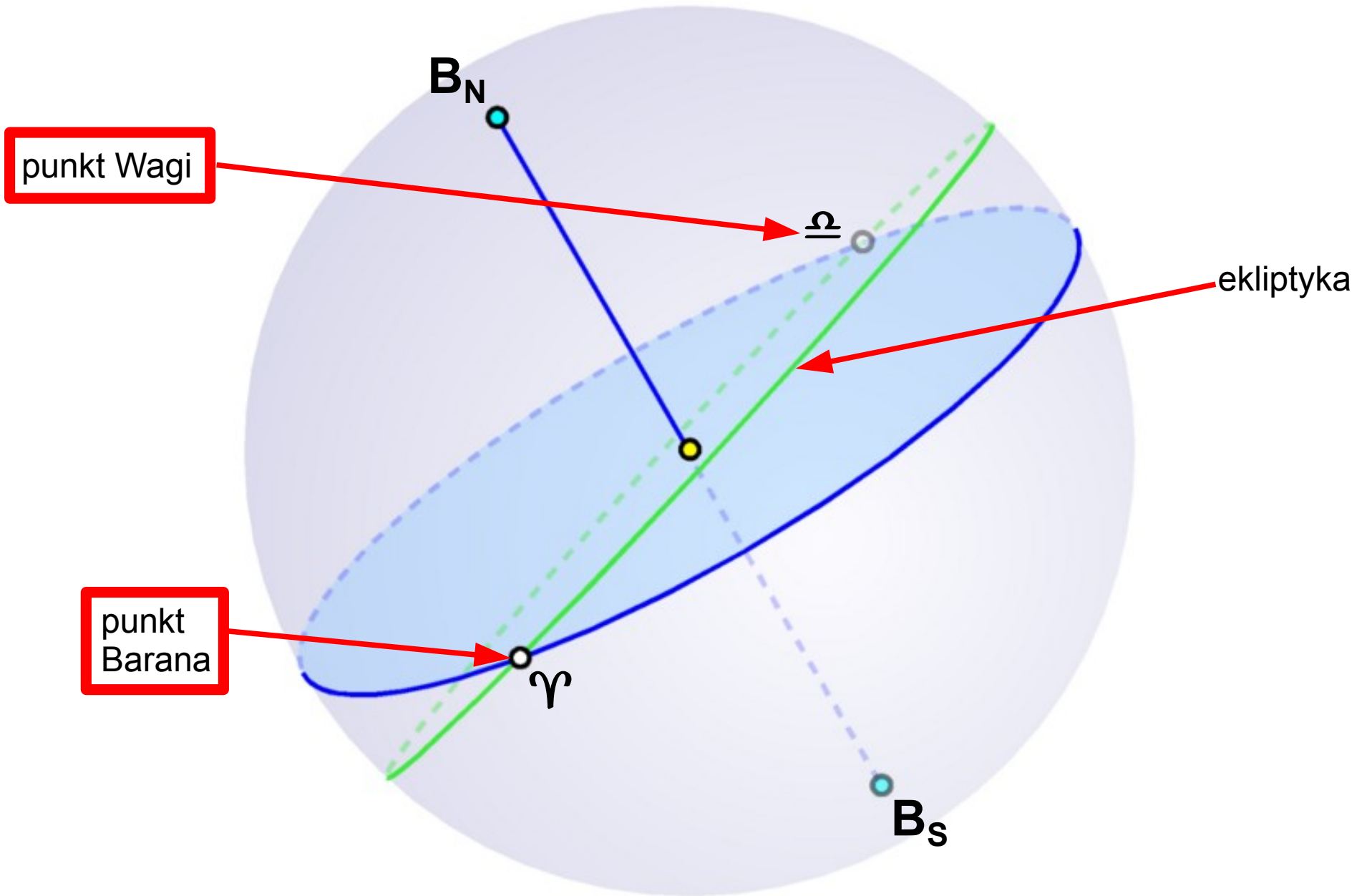
graphics by Tau'olunga





punkt Barana to punkt równonocy wiosennej

punkt Wagi to punkt równonocy jesiennej



punkt Barana to punkt równonocy wiosennej

północny
biegun świata

B_N

obserwator

oś świata

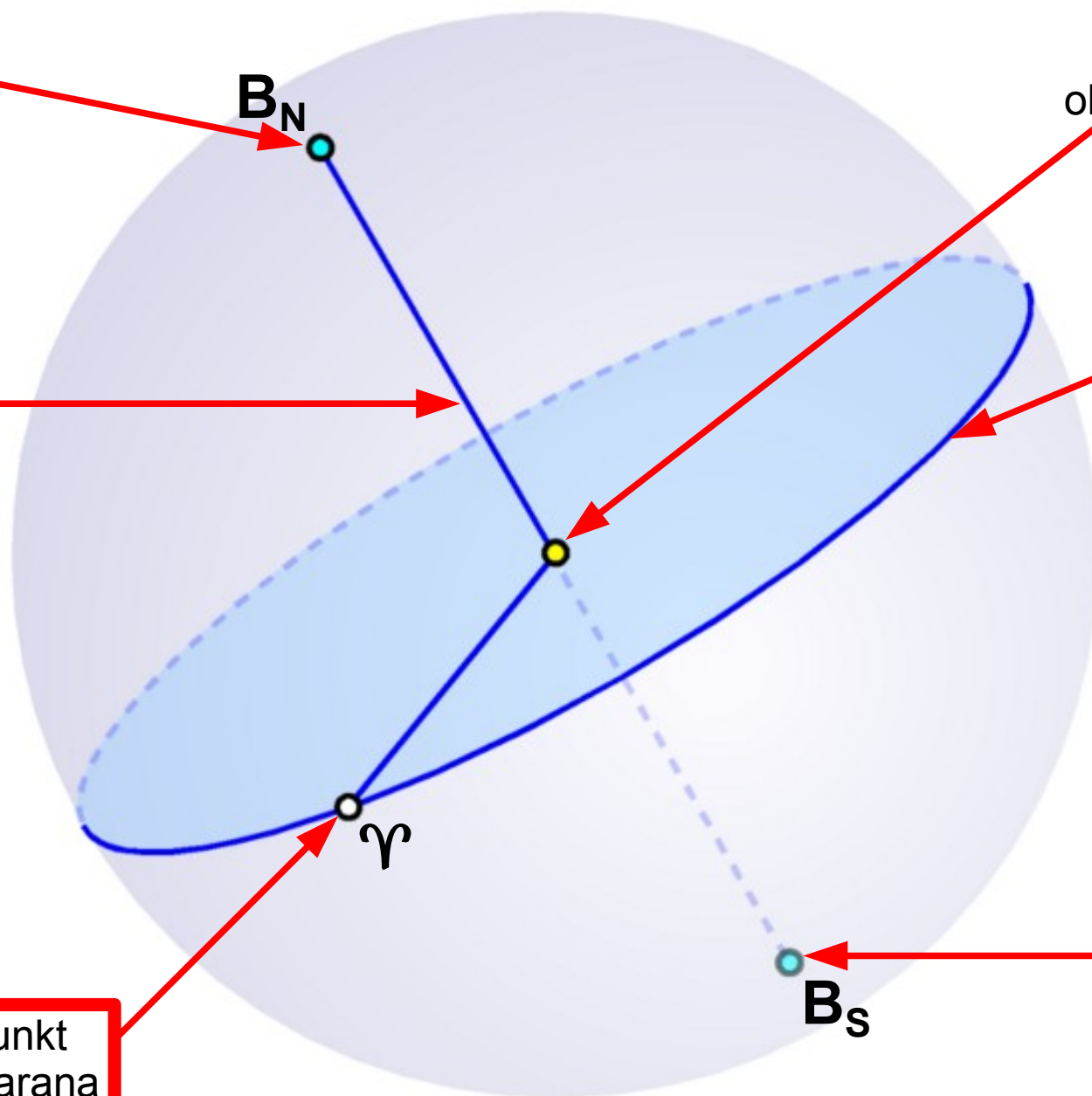
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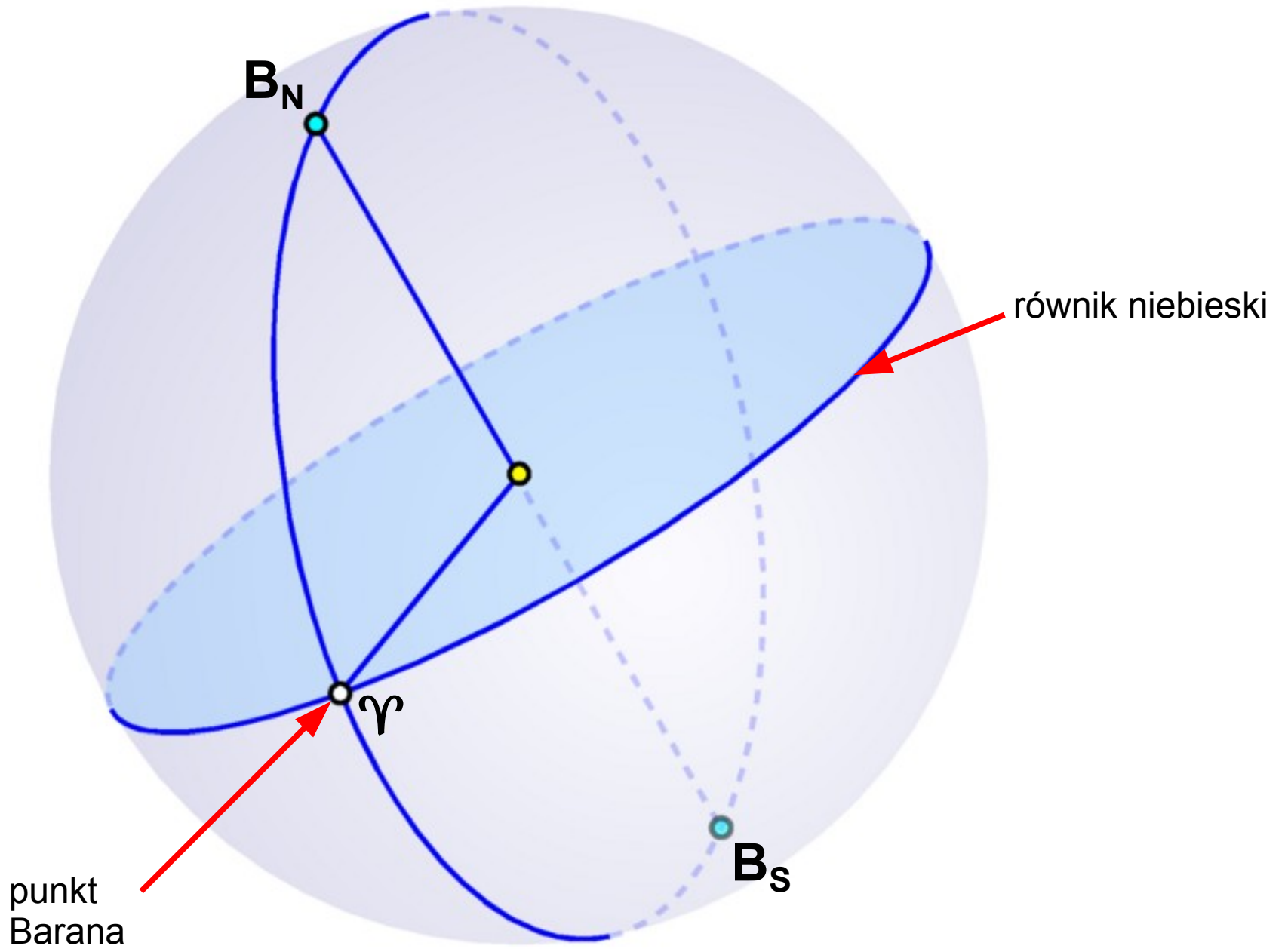
punkt
Barana

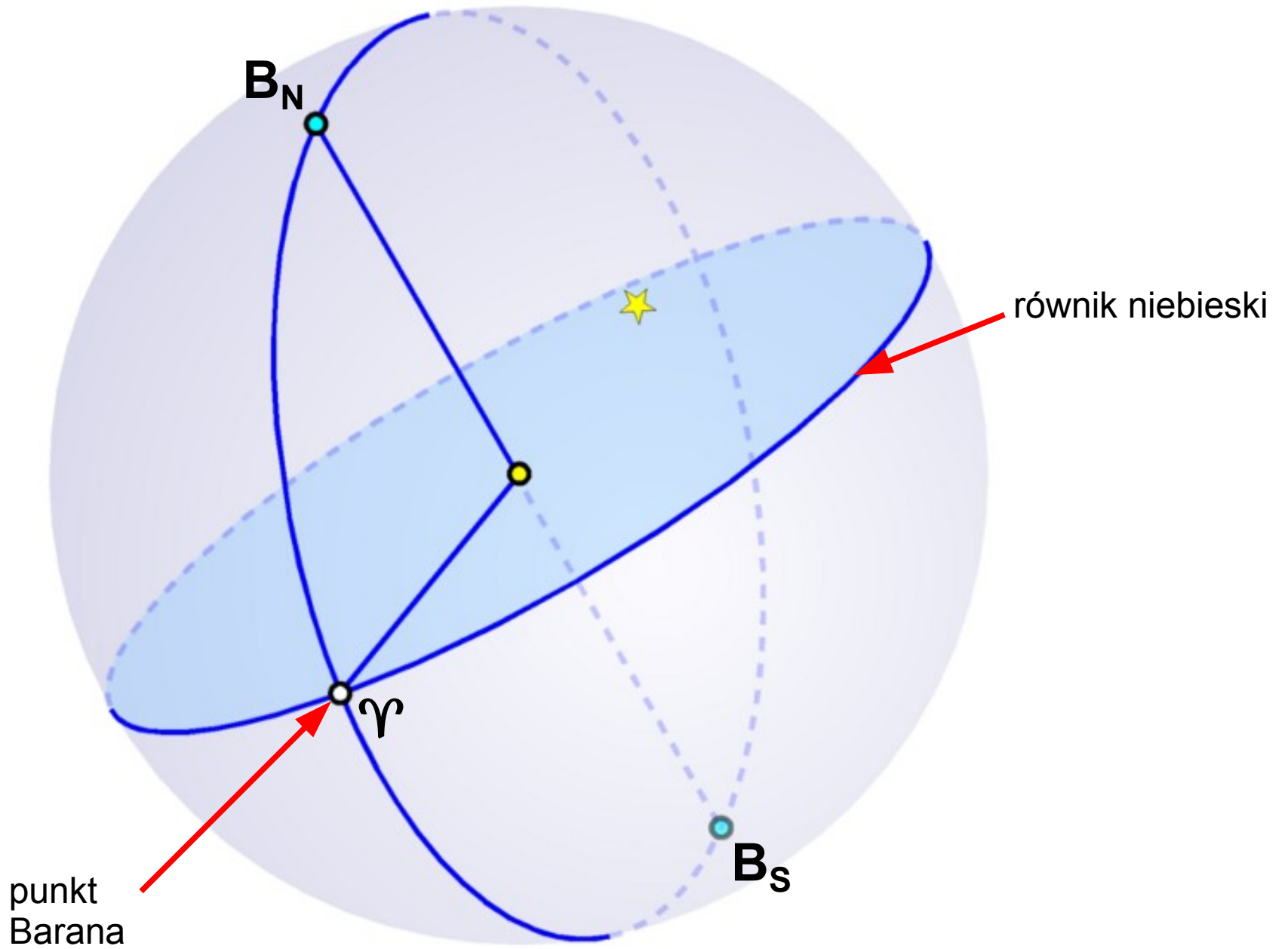
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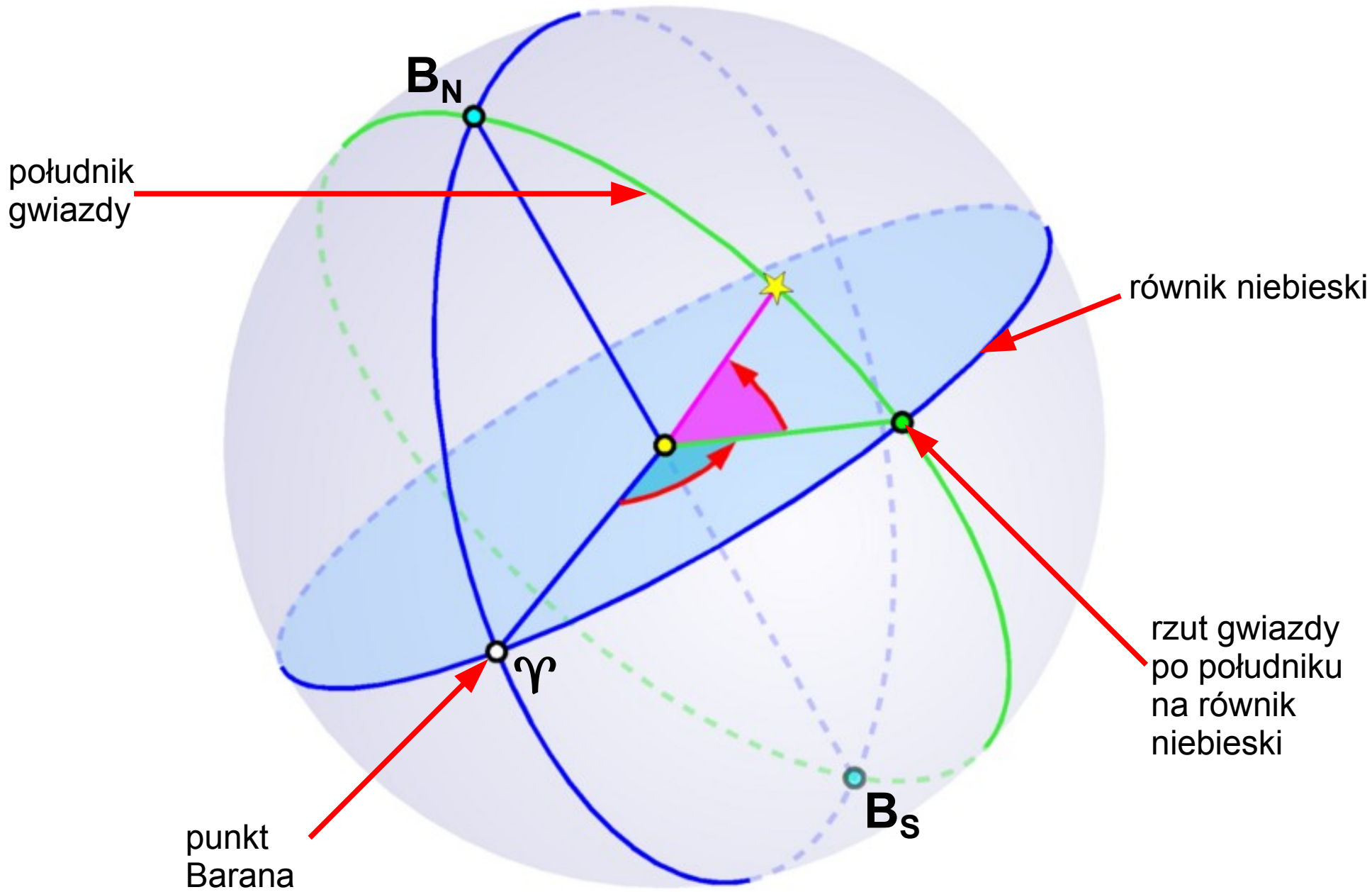
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biegun świata

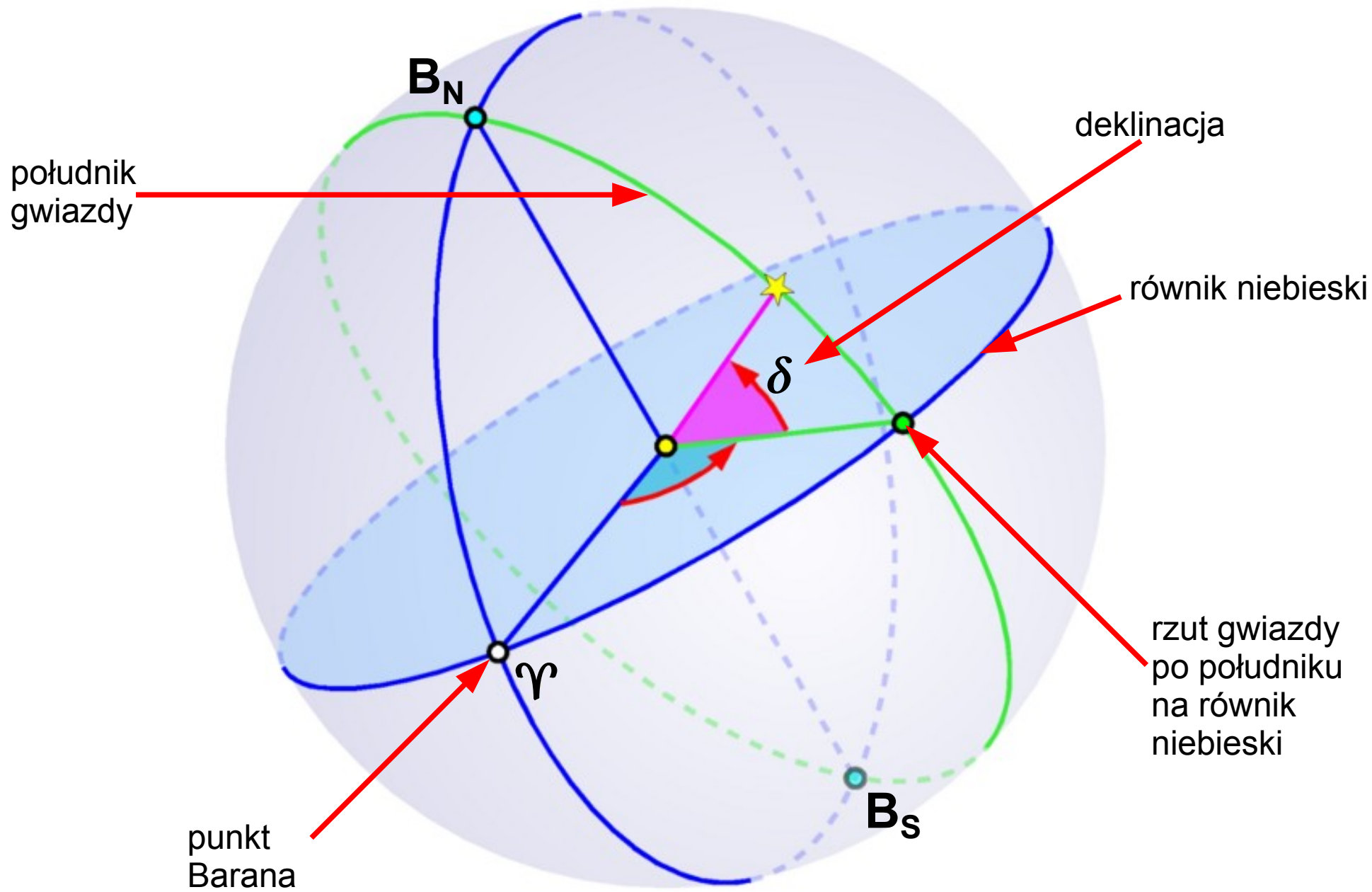
B_S



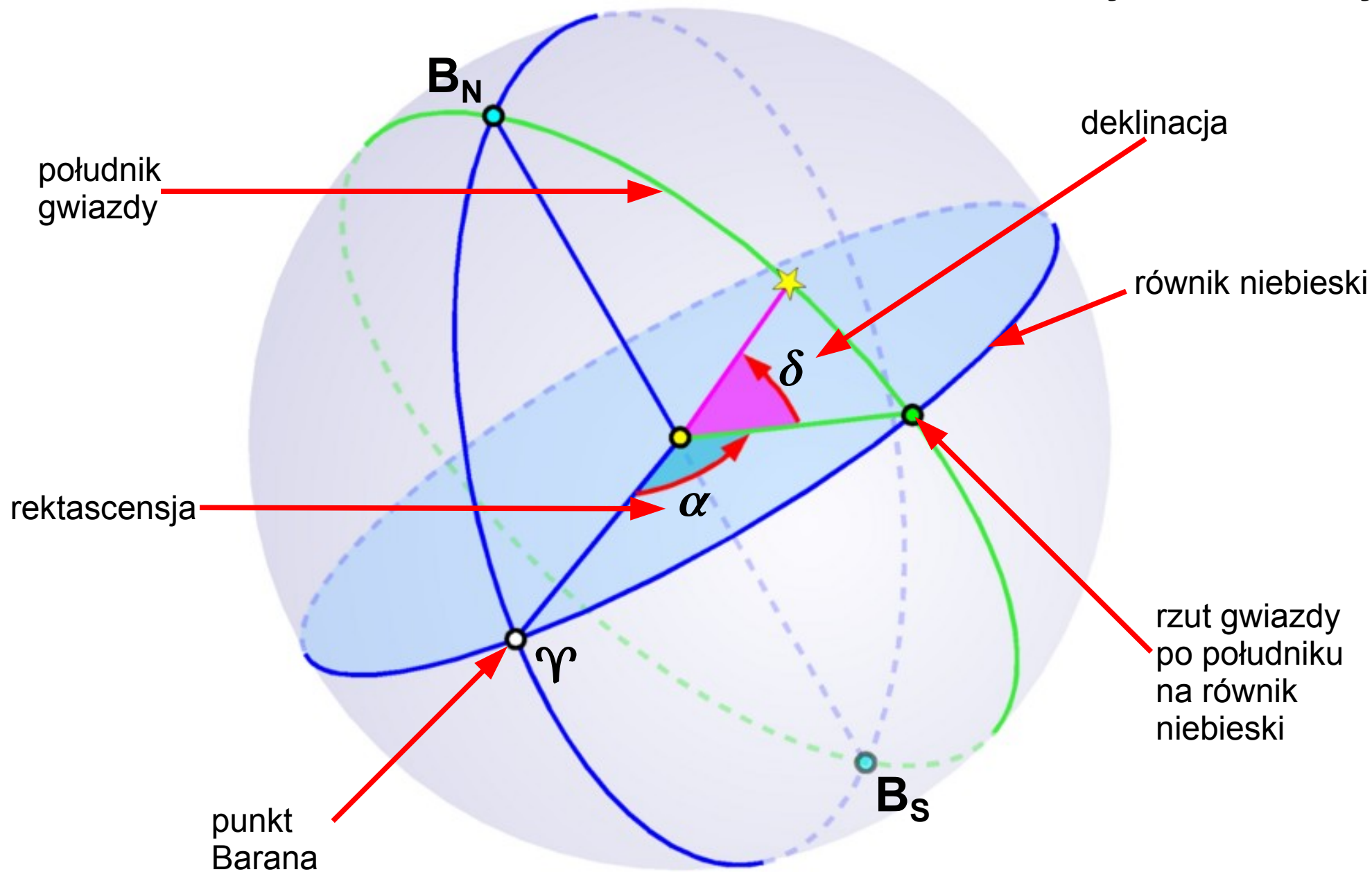




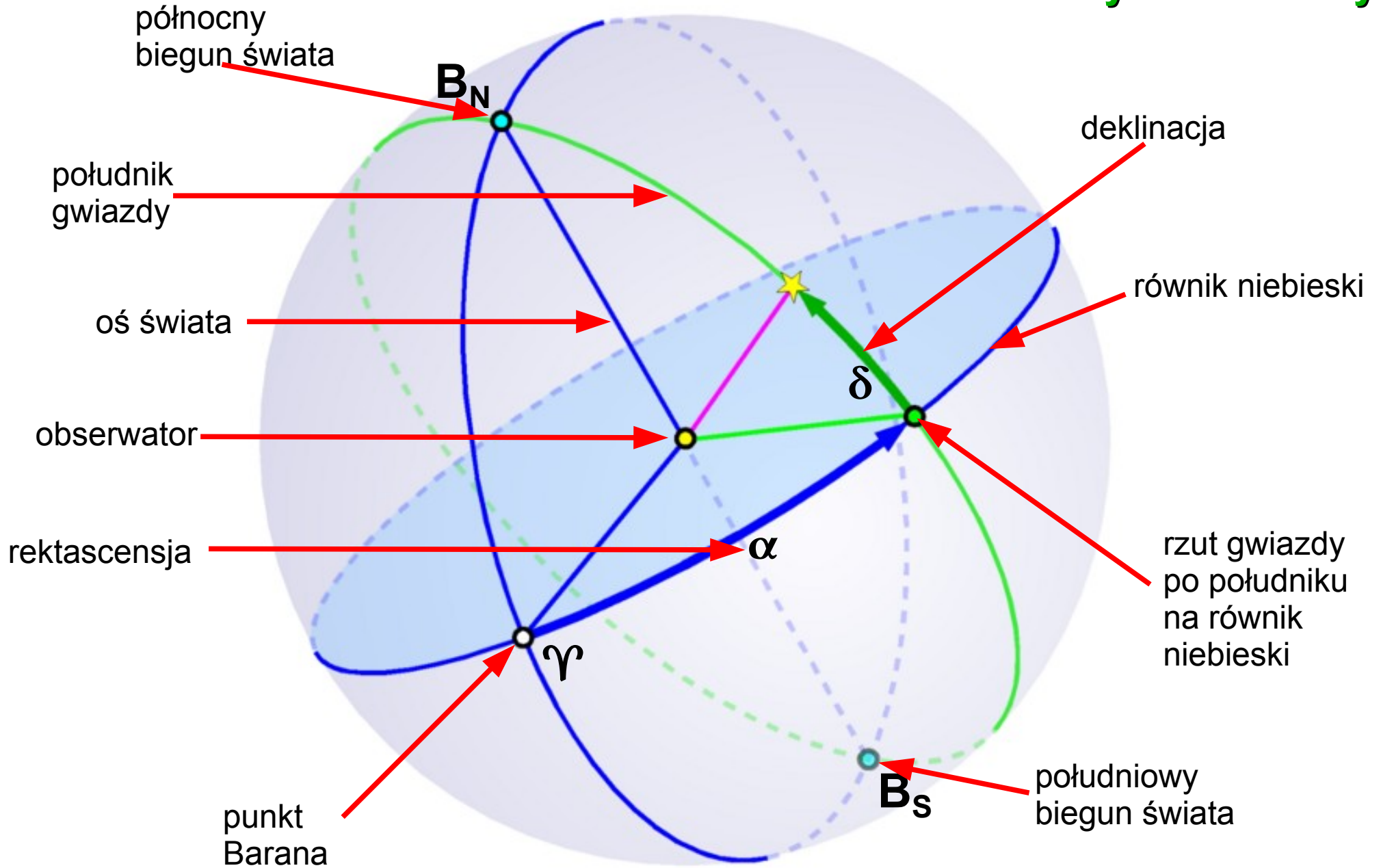




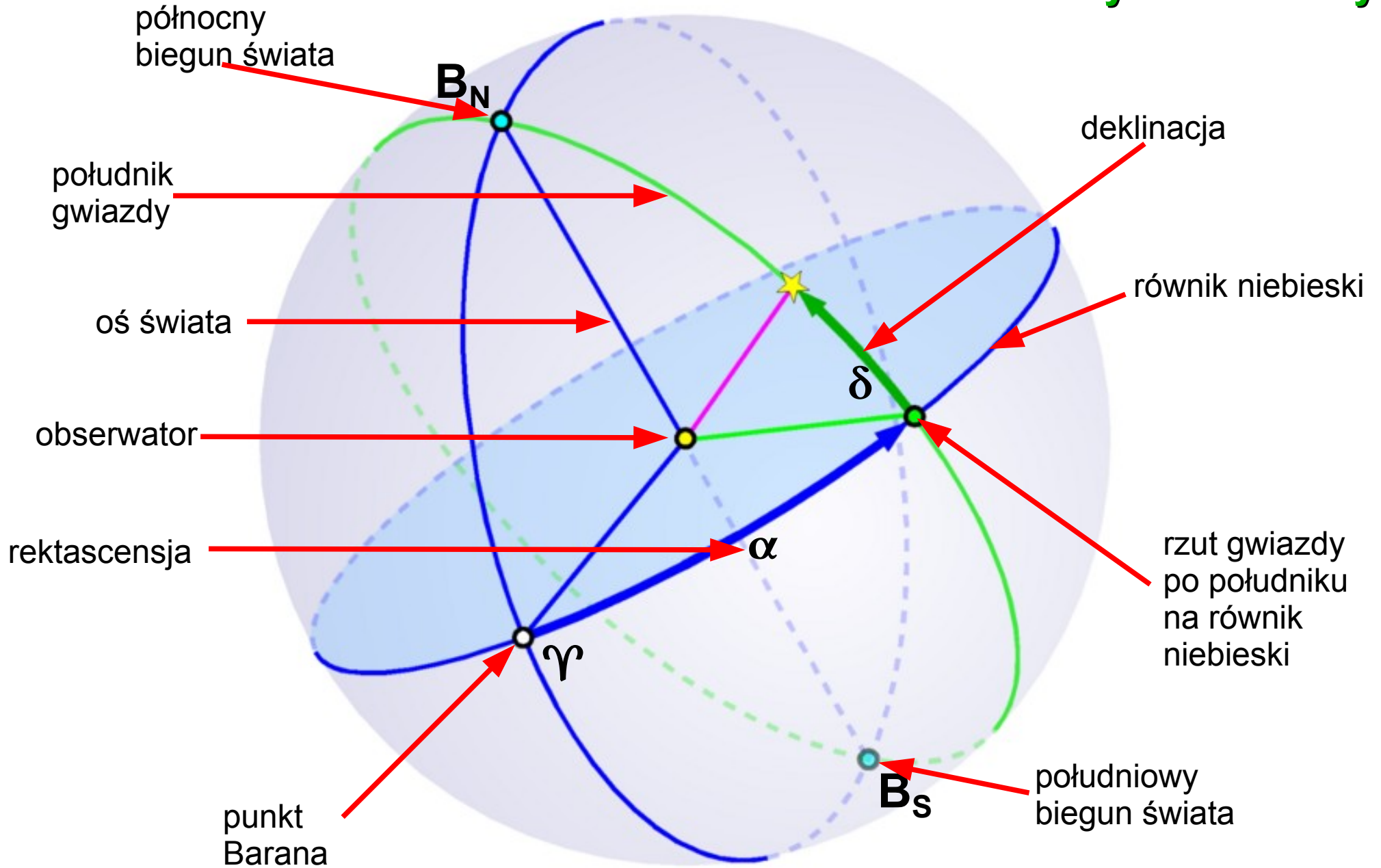
Układ równikowy równonocny



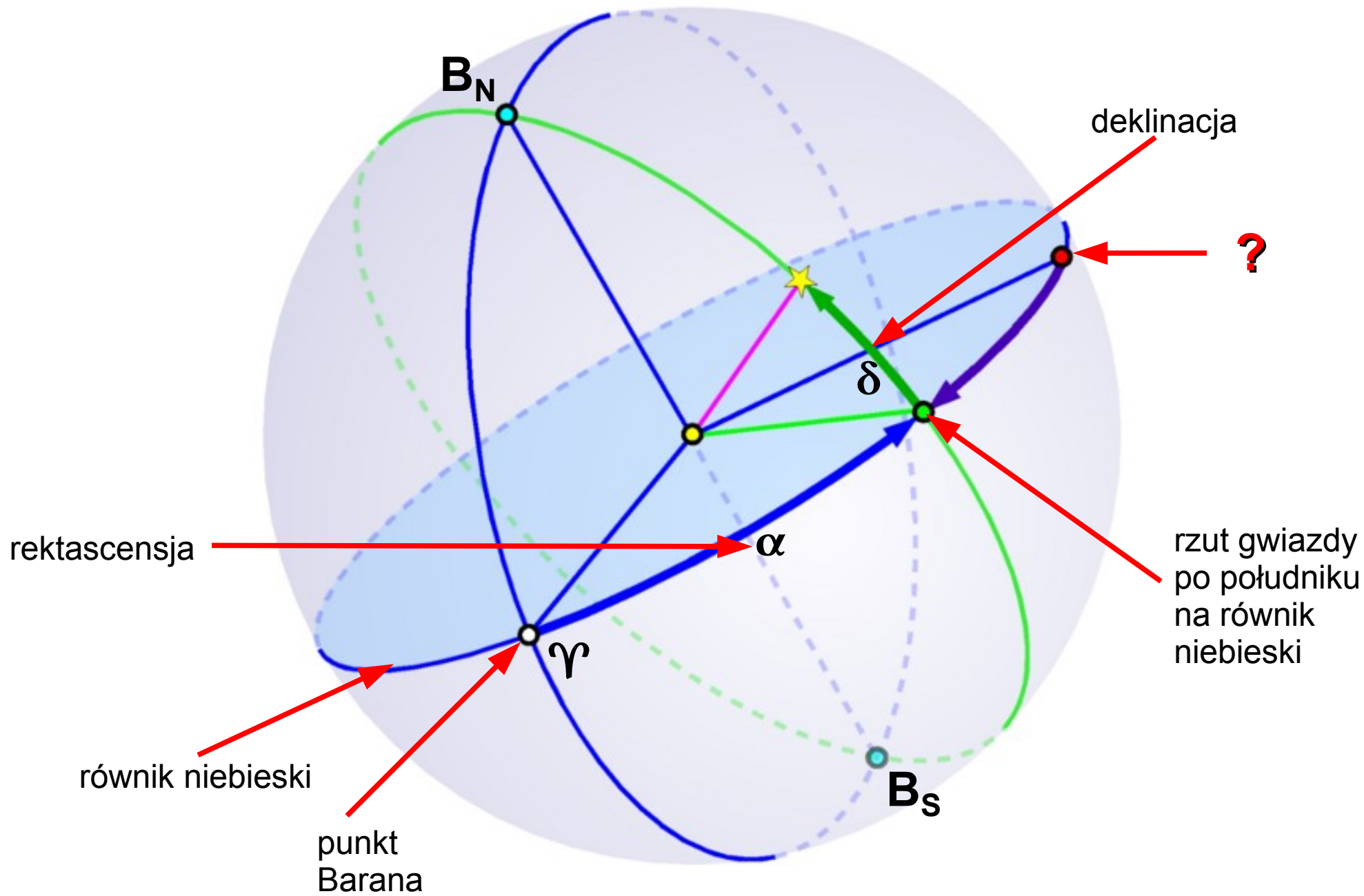
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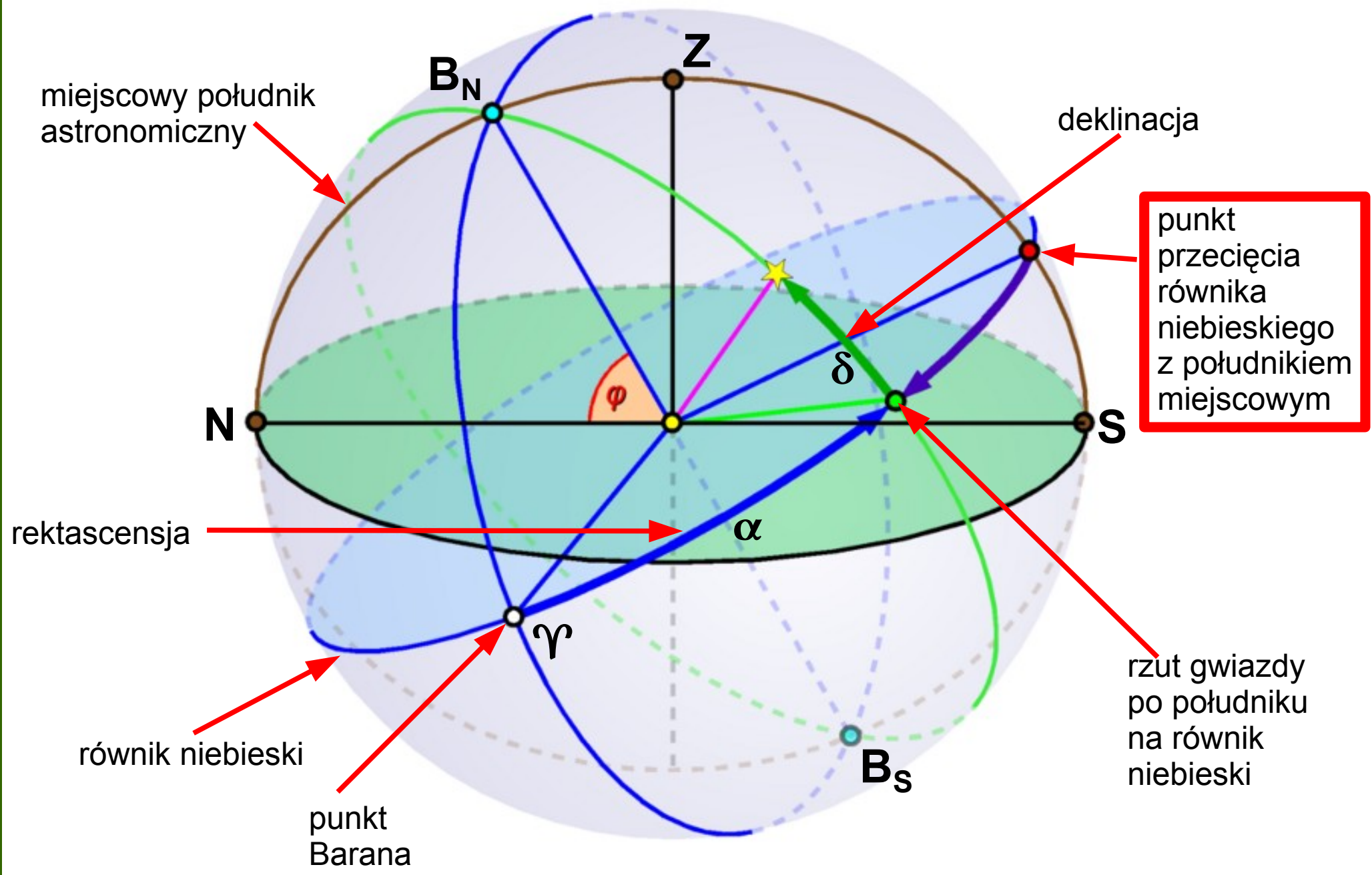


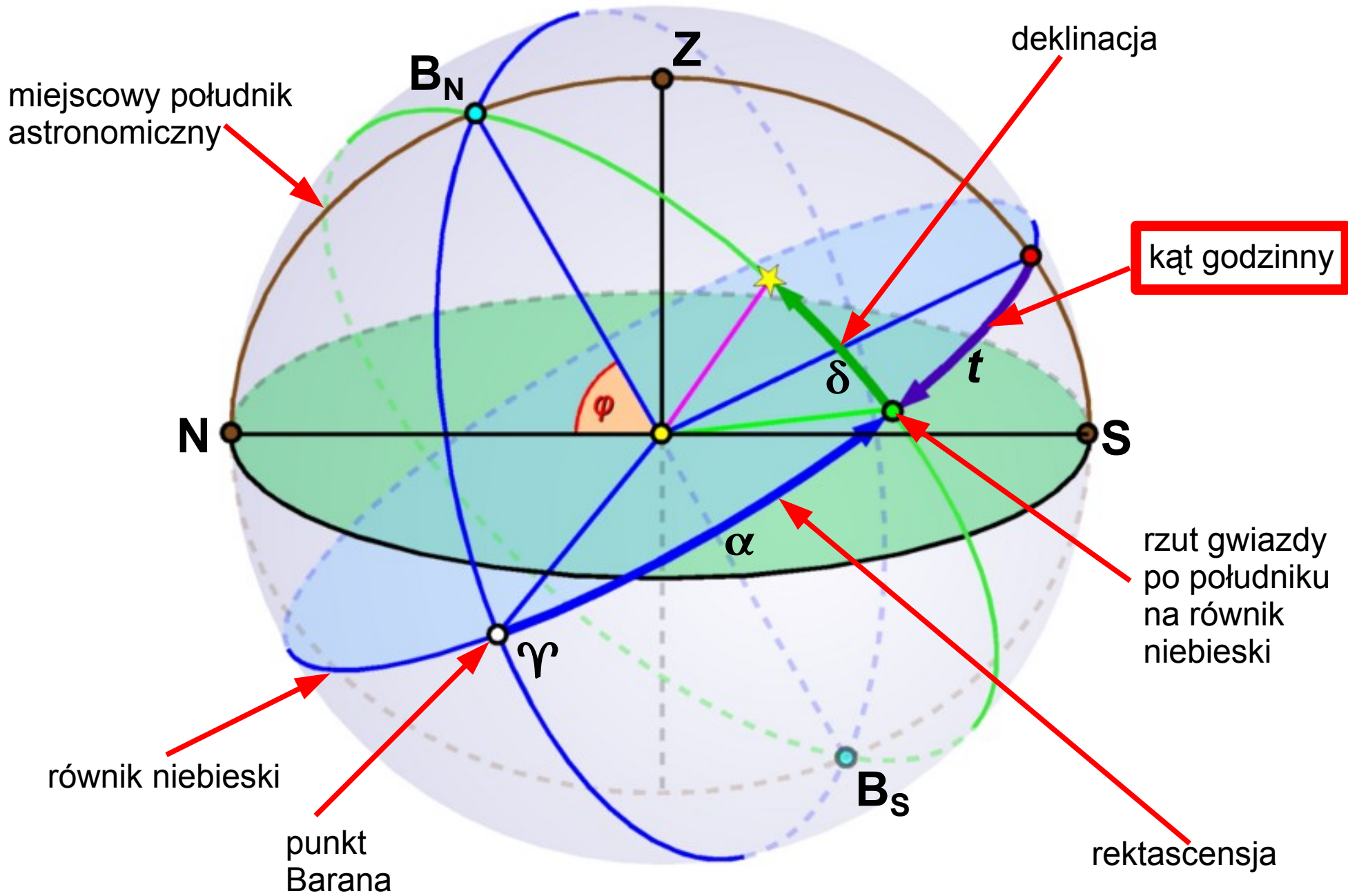
Układ równikowy równonocny



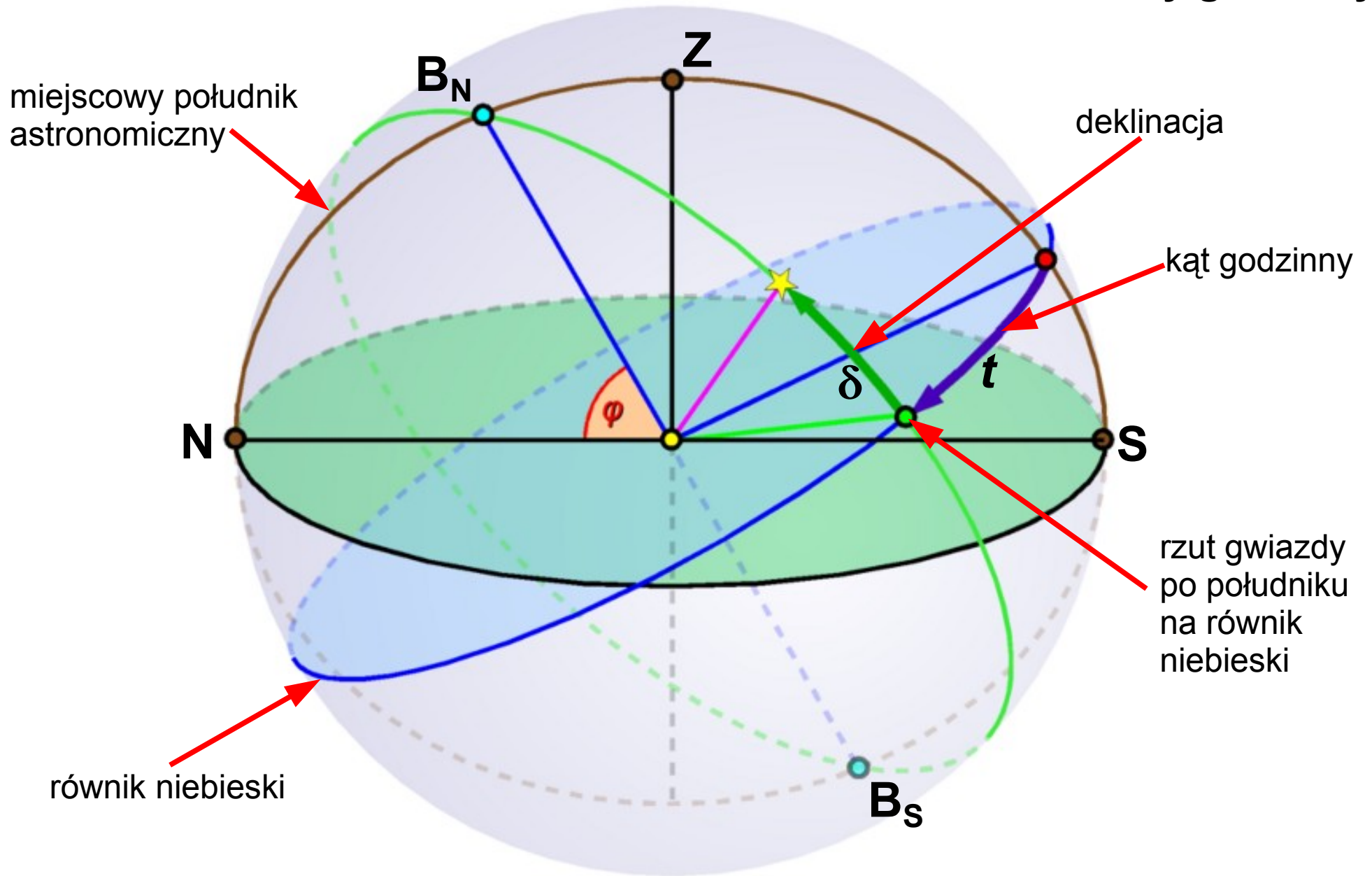
Jest to układ prawoskrętny



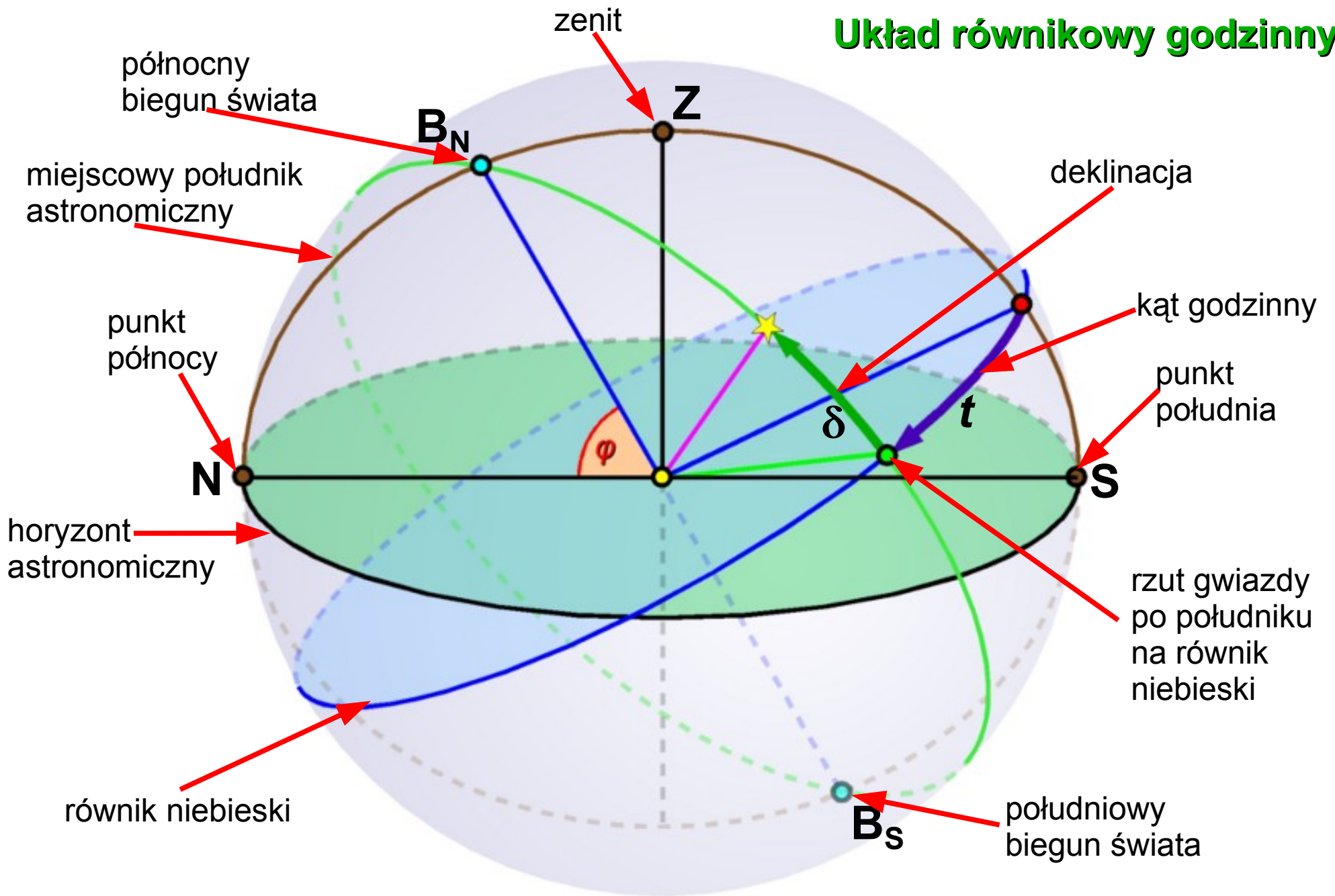




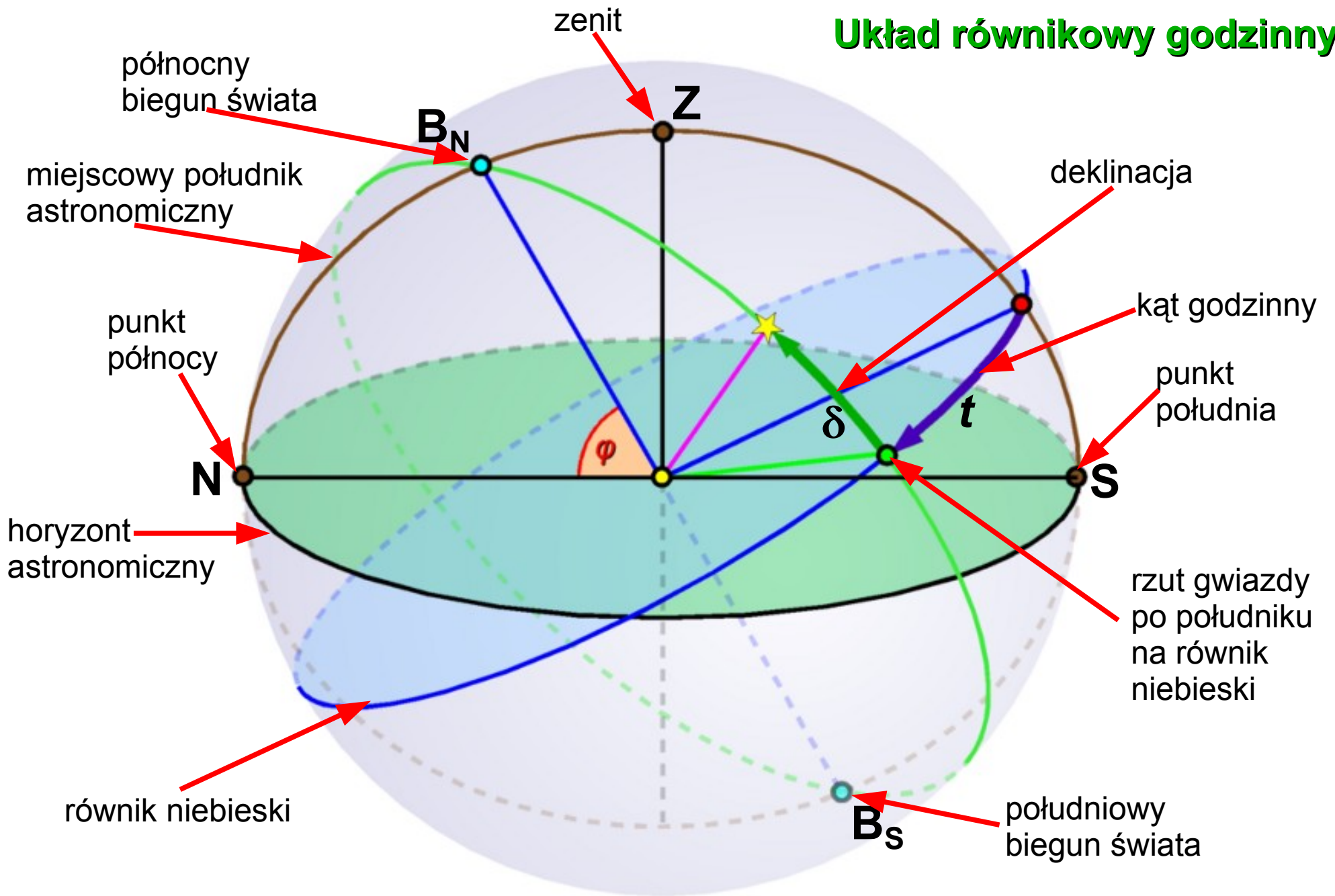
Układ równikowy godzinny



Układ równikowy godzinny

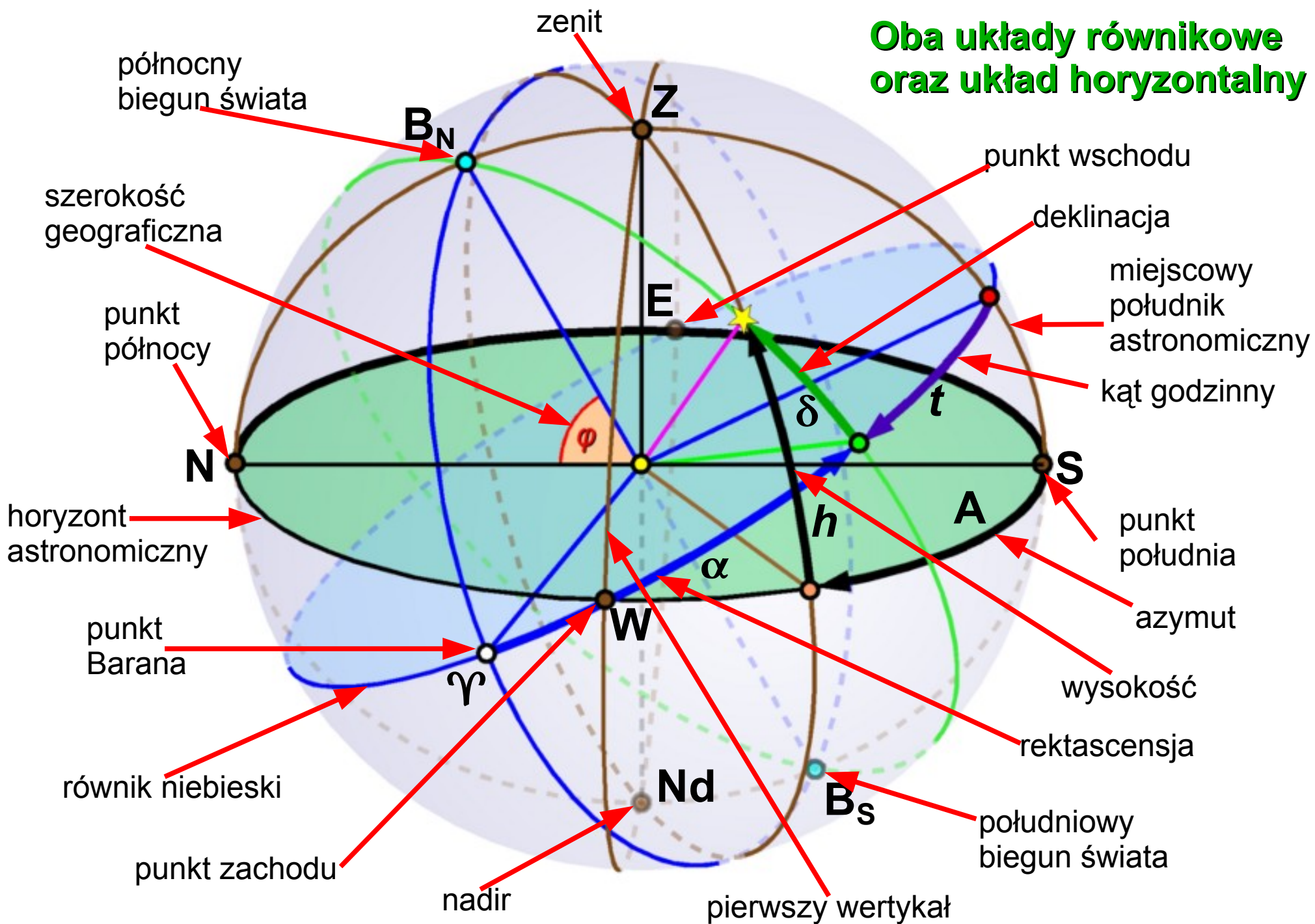


Układ równikowy godzinny



Jest to układ lewoskrętny

Oba układy równikowe oraz układ horyzontalny



Montaż paralaktyczny



TAKAHASHI
FS

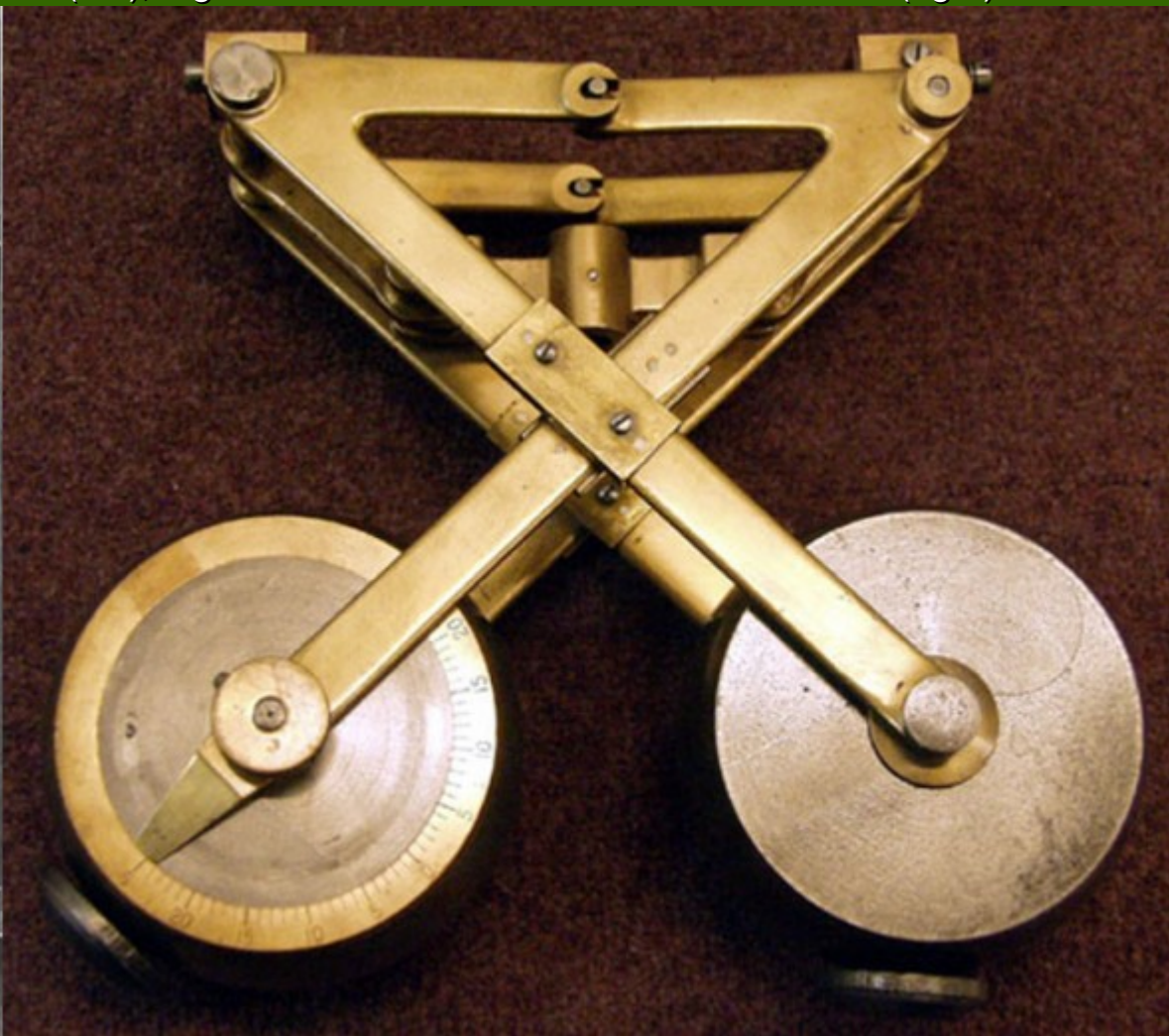
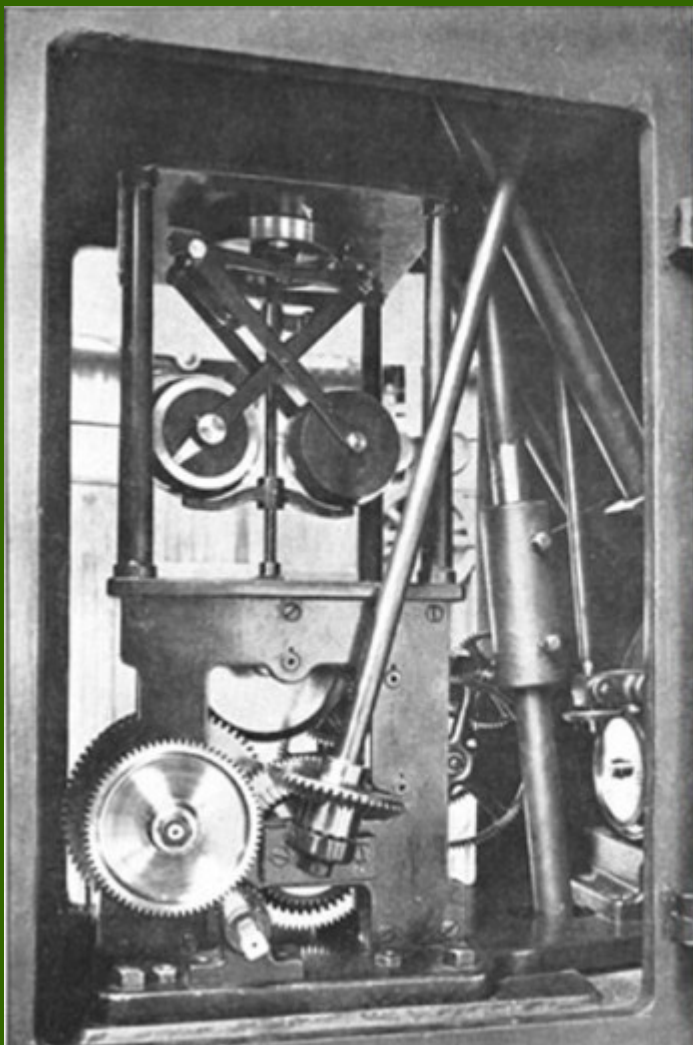


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15 calowy refraktor w Pułkowie, Rosja, 1839

Photo Credit: CSTM Archives (left), Ingenium Museums / Conservation Services (right)



Napęd mechaniczny (ciężarkowy) 15 calowego refraktora z Dominion Observatory w Kanadzie, 1905, wyposażony w regulator Watta.