

O'tilgan mavzuni takrorlash uchun savollar to'plami

1. Magnit maydon nima?
2. Magnit maydon kuch chiziqlari shakli?
3. Magnit maydonni harakterlovchi kattaliklar? deganda nimani tushunasiz?
4. Magnit mamenti tushunchasi?
5. Magnit manbai ?
6. Magnit maydon qutblari necha va ular nimalar?
7. Magnit maydoni zaryadli zarra bilan tasirlashadimi
8. Sirtga o'tkazilgan normal deganda nimani tushunasiz.

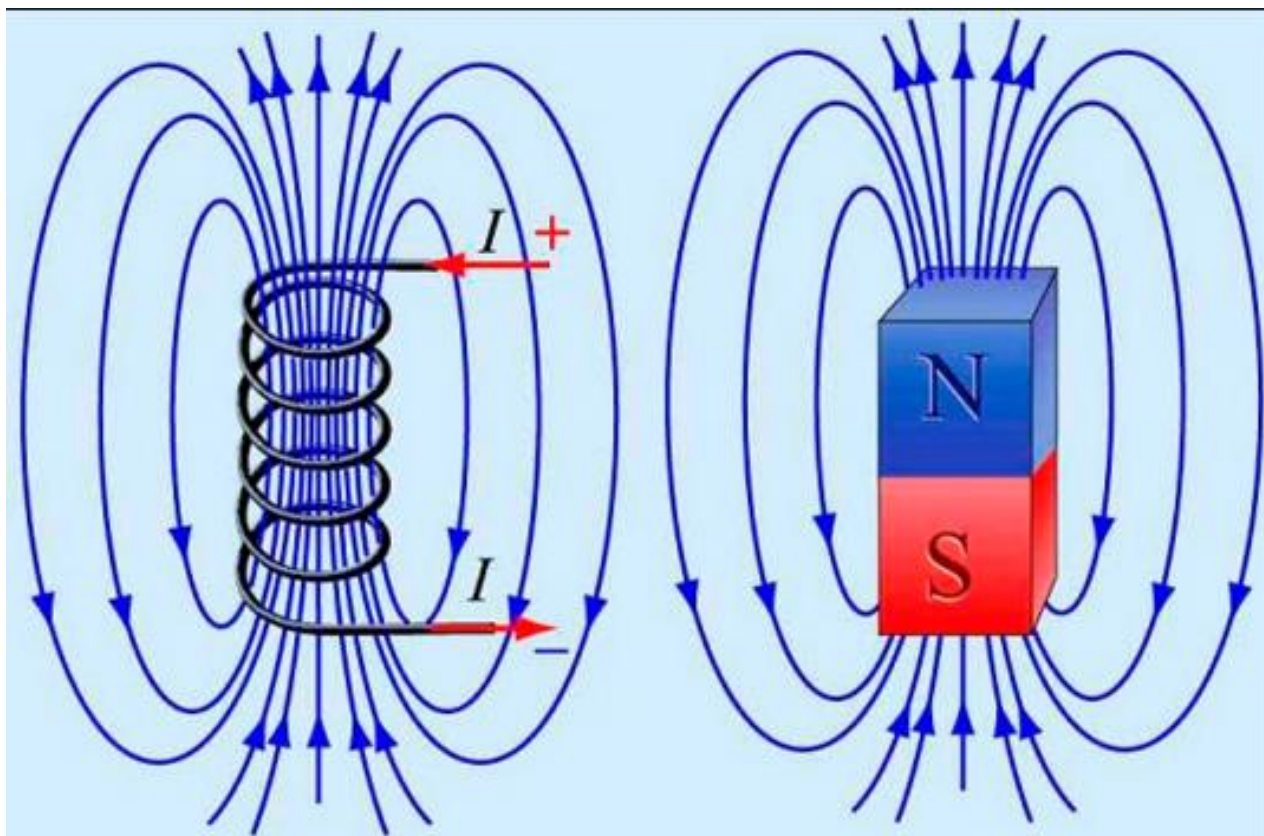
NDKTU litsey o'qituvchisi Faxriddinov Orifjonni 2-kurslarga ochiq dars ishlanmasi.

Mavzu: Bio-Savar-Laplas qonuni va uni to'g'ri, aylanma, solenoid va toroidlarga tadbiqu. Magnit maydon uchun superpozitsiya prinsipi. Magnit induksiya oqimi

Mavzu rejalari

- ▶ Magnit maydon haqida tushuncha
- ▶ Magnit maydon induksiya chiziqlari
- ▶ Bio-Savar-Laplas qonunining fizik manosi
- ▶ To'g'ri cheksiz o'tkazgichning magnit maydoni
- ▶ Aylanma tokning magnit maydoni
- ▶ Solenoid va Toroidning magnit maydoni
- ▶ Magnit maydonining superpozitsiya prinsipi
- ▶ Yer uchun magnit maydonining ahamiyati
- ▶ Hozir vaqtda zamonaviy texnikada magnit maydonidan foydalanish

Magnit maydon haqida tushuncha



N-Shimol (North);

S-Janub (South)

Magnit qutblarining doimiy qolishi



Magnitik moddalar

Fe-5



Ni-5



Co-5



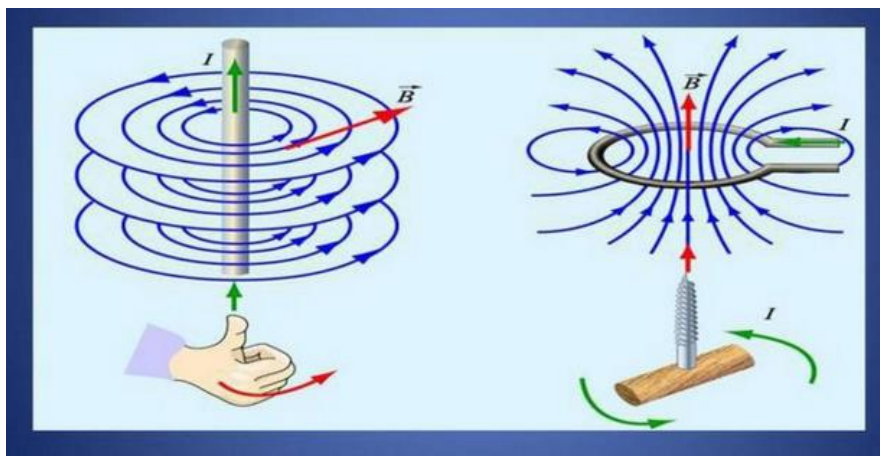
Mn-5



Mg-2



Magnit maydon induksiya chiziqlari



Parma qoidasiga: Parmaning ilgarilanma harakati tokni yo'nalishini ko'rsatsa, parma dastasining aylanma harakat yo'nalishi magnit induksiya kuch chiziqlari yo'nalishini ko'rsatadi.

$$\vec{B} = \mu\mu_0\vec{H}$$

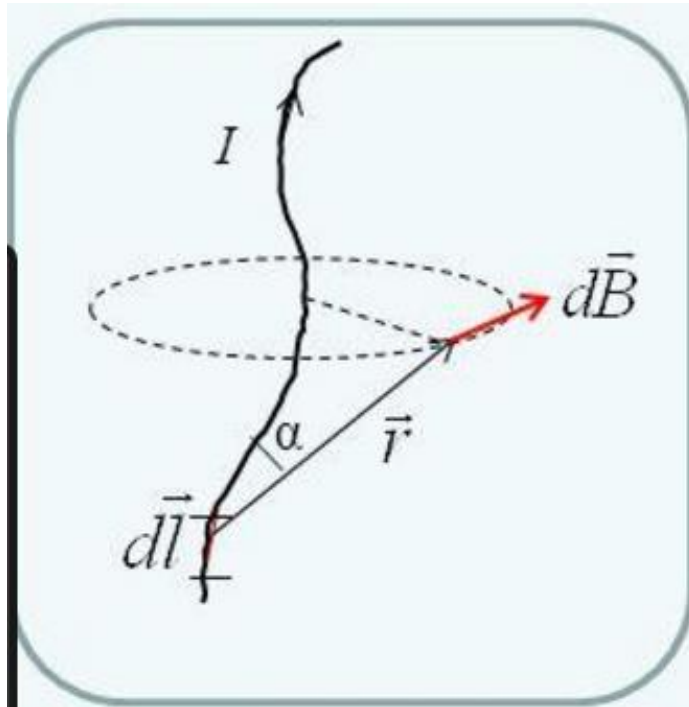
$\vec{B}(T)$ – magnit maydon induksiyasi

$\vec{H}(\text{Ersted})$ – magnit maydon kuchlanganligi

$$\mu_0 = 4\pi \cdot 10^{-7} \left(\frac{T \cdot m}{A} \right) - \text{magnit doimiysi}$$

μ – muhitning magnit singdiruvchanligi

Bio-Savar-Laplas qonunining fizik manosi

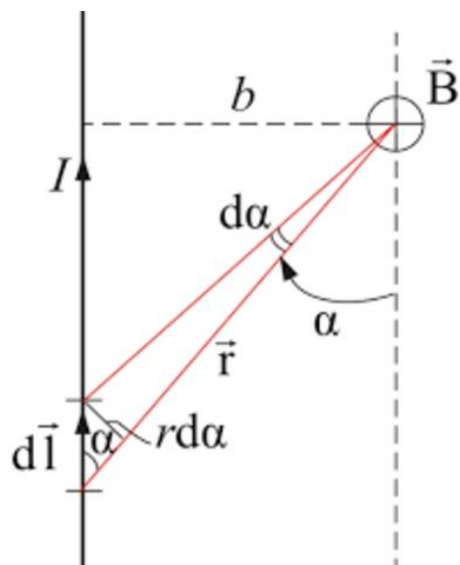


$$dB = \frac{\mu\mu_0 I [\vec{dl} \vec{r}]}{4\pi r^3}$$

$$[\vec{dl} \vec{r}] = dl \cdot r \cdot \sin\alpha$$

$$dB = \frac{\mu\mu_0 I dl \cdot \sin\alpha}{4\pi r^2}$$

To'g'ri cheksiz o'tkazgichning magnit maydoni



$$r d\alpha = dl \sin \alpha$$

$$dB = \frac{\mu \mu_0 I r d\alpha}{4\pi r^2}$$

$$dB = \frac{\mu \mu_0 I d\alpha}{4\pi r}$$

$$R = r \cdot \sin \alpha$$

$$\int dB = \int \frac{\mu \mu_0 I \sin \alpha d\alpha}{4\pi R}$$

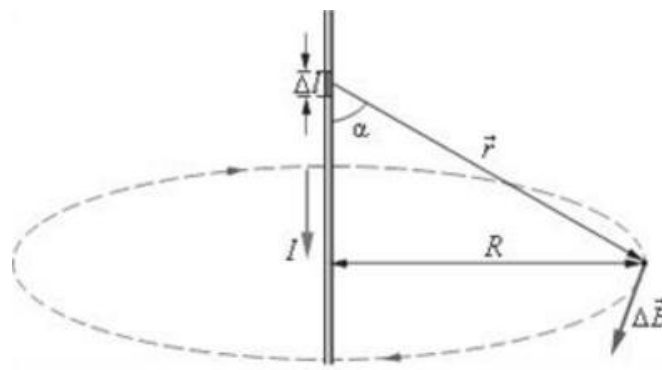
$$B = \frac{\mu \mu_0 I}{4\pi} \int_0^\pi \frac{d\alpha}{R \sin \alpha}$$

$$B = \frac{\mu \mu_0 I}{4\pi R} \int_0^\pi \sin \alpha \cdot d\alpha$$

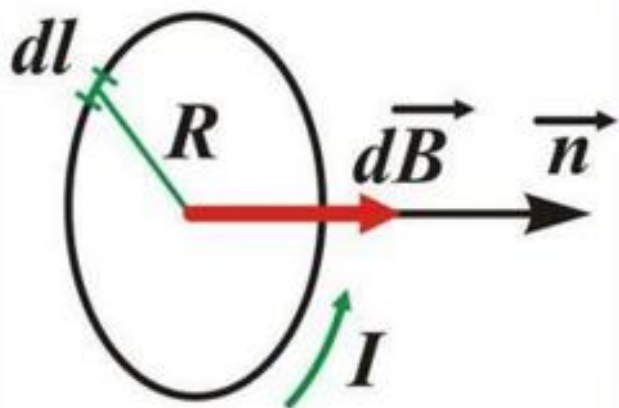
$$B = \frac{\mu \mu_0 I}{4\pi R} (-\cos \alpha) \Big|_0^\pi$$

$$B = \frac{\mu \mu_0 I}{4\pi R} (-(-1 - 1))$$

$$\boxed{B = \frac{\mu \mu_0 I}{2\pi R}}$$



Aylanma tokning magnit maydoni

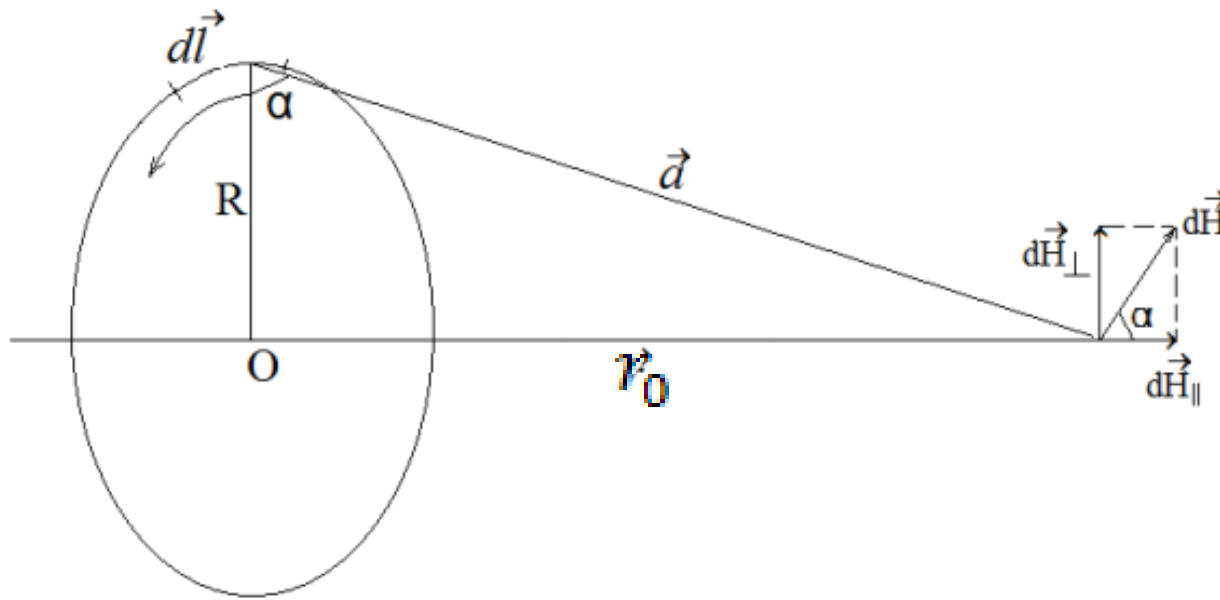


$$\alpha = \frac{\pi}{2}, r = R$$

$$B = \frac{\mu\mu_0 I}{4\pi} \int \frac{dl \sin \alpha}{r^2} = \frac{\mu\mu_0 I}{4\pi R^2} \int dl = \frac{\mu\mu_0 I}{2R}$$

$$B = \frac{\mu\mu_0 I}{2R}$$

Aylanma tok markazidagi
magnit induksiya



$$dB = \frac{\mu\mu_0 I dl \cdot \sin\alpha}{4\pi r^2}$$

$$B = \frac{\mu\mu_0 I}{4\pi} \cdot \frac{R}{r^3} \int_0^{2\pi R} dl$$

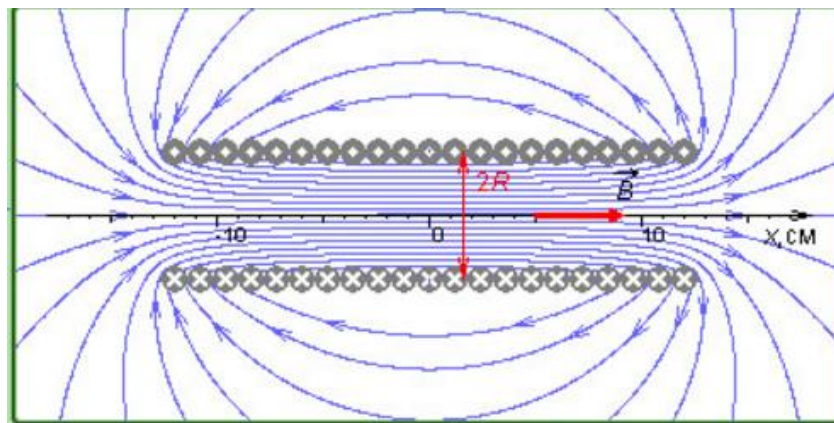
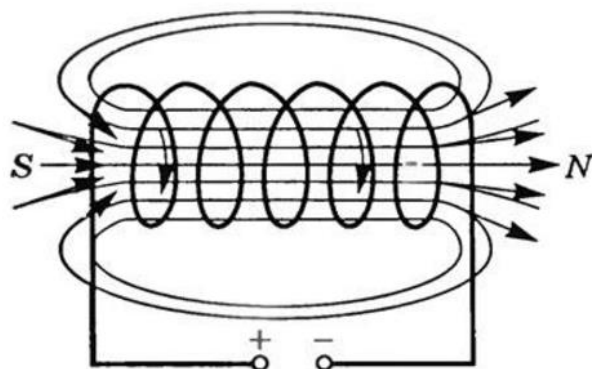
$$\int dB = \frac{\mu\mu_0 I}{4\pi} \int \frac{dl \cdot \sin\alpha}{r^2}$$

$$B = \frac{\mu\mu_0 I}{4\pi} \cdot \frac{R}{r^3} \cdot 2\pi R$$

$$\sin\alpha = \frac{R}{r} = \frac{R}{\sqrt{r_0^2 + R^2}}$$

$$B = \frac{\mu\mu_0 I}{2} \cdot \frac{R^2}{(R^2 + r_0^2)^{3/2}}$$

Solenoid va Toroidning magnit maydoni



$$B = \frac{\mu\mu_0 I}{2} \cdot \frac{R^2}{(R^2 + r_0^2)^{3/2}}$$

$$\int dB = \int \frac{\mu\mu_0 I}{2} \cdot \frac{R^2}{(R^2 + r_0^2)^{3/2}} \cdot \frac{n}{l} \cdot dr_0$$

$$B = \frac{\mu\mu_0 I}{2} \cdot \frac{n}{l} \int \frac{R^2}{(R^2 + r_0^2)^{3/2}} \cdot dr_0$$

$$r_0 = R \operatorname{ctg} a$$

$$dr_0 = -\frac{R da}{\sin^2(a)}$$

$$R^2 + r_0^2 = (R^2 + (R \operatorname{ctg} a)^2) = \frac{R^2}{\sin^2 a}$$

Solenoidning magnit maydoni induksiyasi

$$B = \frac{\mu\mu_0 In}{2l} \cdot \int \frac{R^2 \left(-\frac{Rda}{\sin^2(a)} \right)}{\left(\frac{R^2}{\sin^2 a} \right)^{\frac{3}{2}}}$$

$$B = \frac{\mu\mu_0 In}{2l} \cdot \int_{a_2}^{a_1} -\sin a$$

$$B = \frac{\mu\mu_0 In}{2l} \cdot (\cos a_2 - \cos a_1)$$

Yetarlicha uzun solenoid uchun $a_1 = 0^\circ$; $a_2 = 180^\circ$

$$B = \frac{\mu\mu_0 In}{l}$$



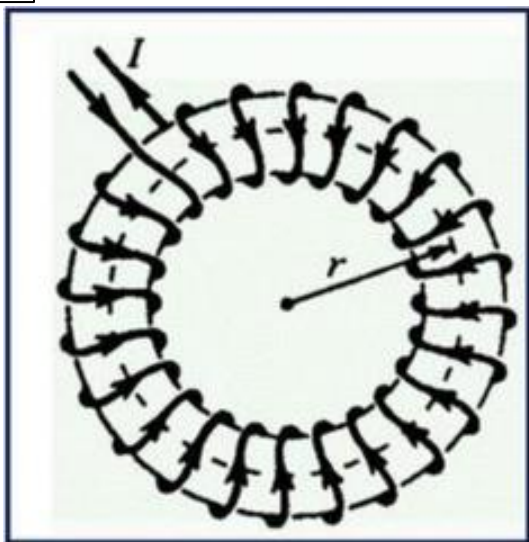
Cheksiz uzun solenoid o'qidagi
magnit induksiyasi

Toroidning magnit maydon induksiyasi

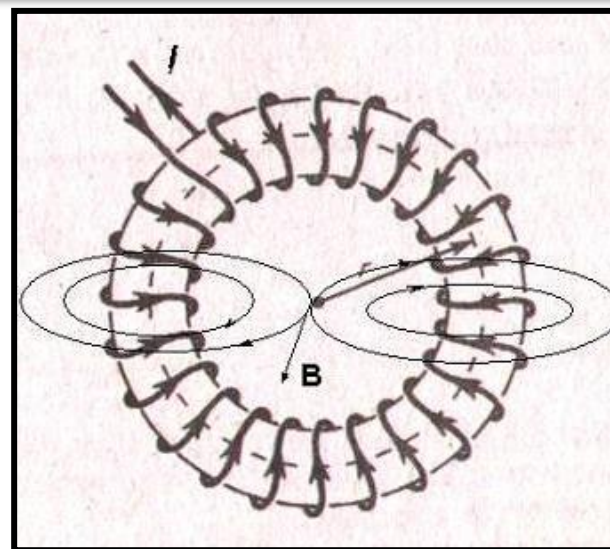
$$B = \frac{\mu\mu_0 In}{l}$$

$l = 2\pi R$ – toroidni aylana radiusi

$$B = \frac{\mu\mu_0 In}{2\pi R}$$



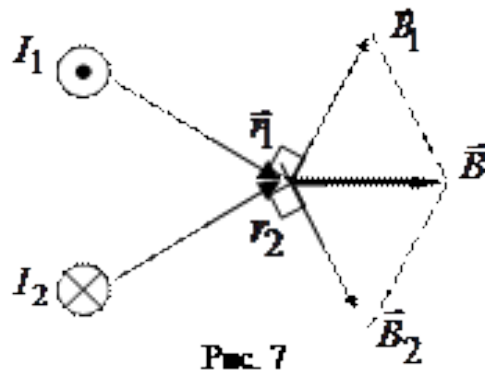
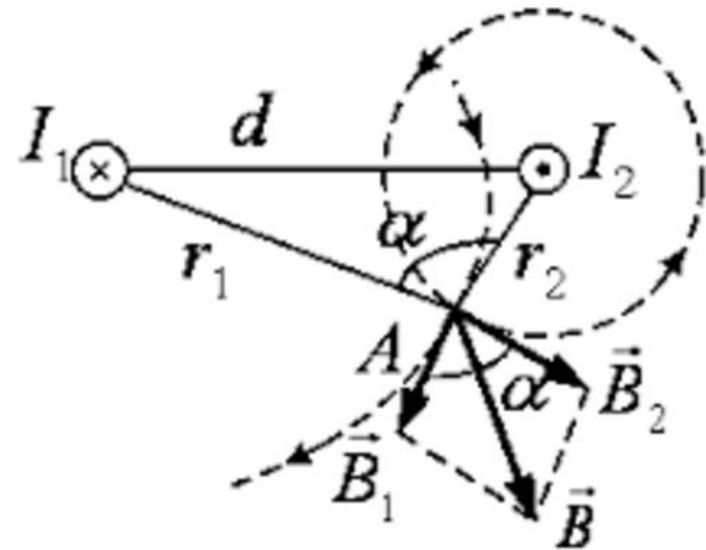
Toroidning hosil qilgan magnit induksiyasi



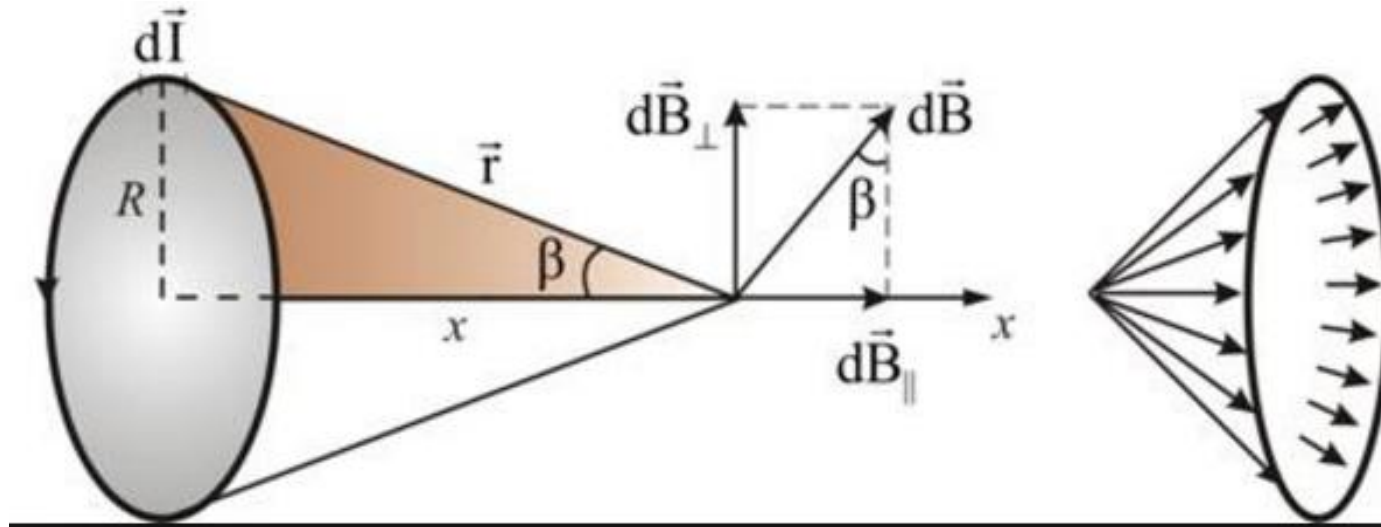
Magnit maydonining superpozitsiya prinsipi

$$\vec{B} = \sum_{i=1}^n \vec{B}_i$$

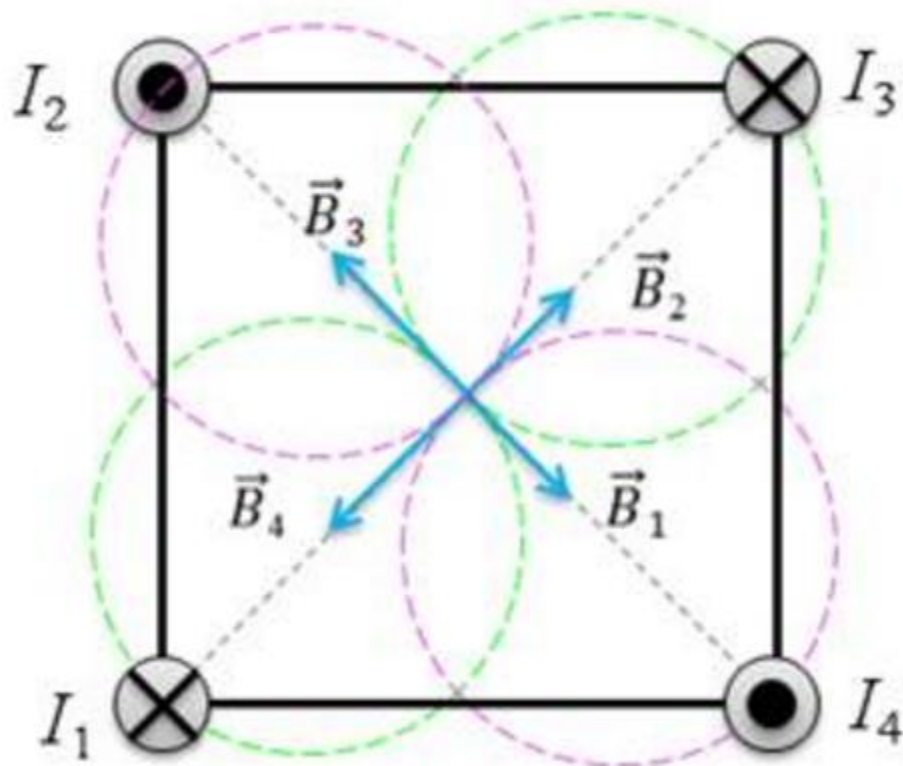
$$\vec{B} = \vec{B}_1 + \vec{B}_2 + \dots + \vec{B}_n$$



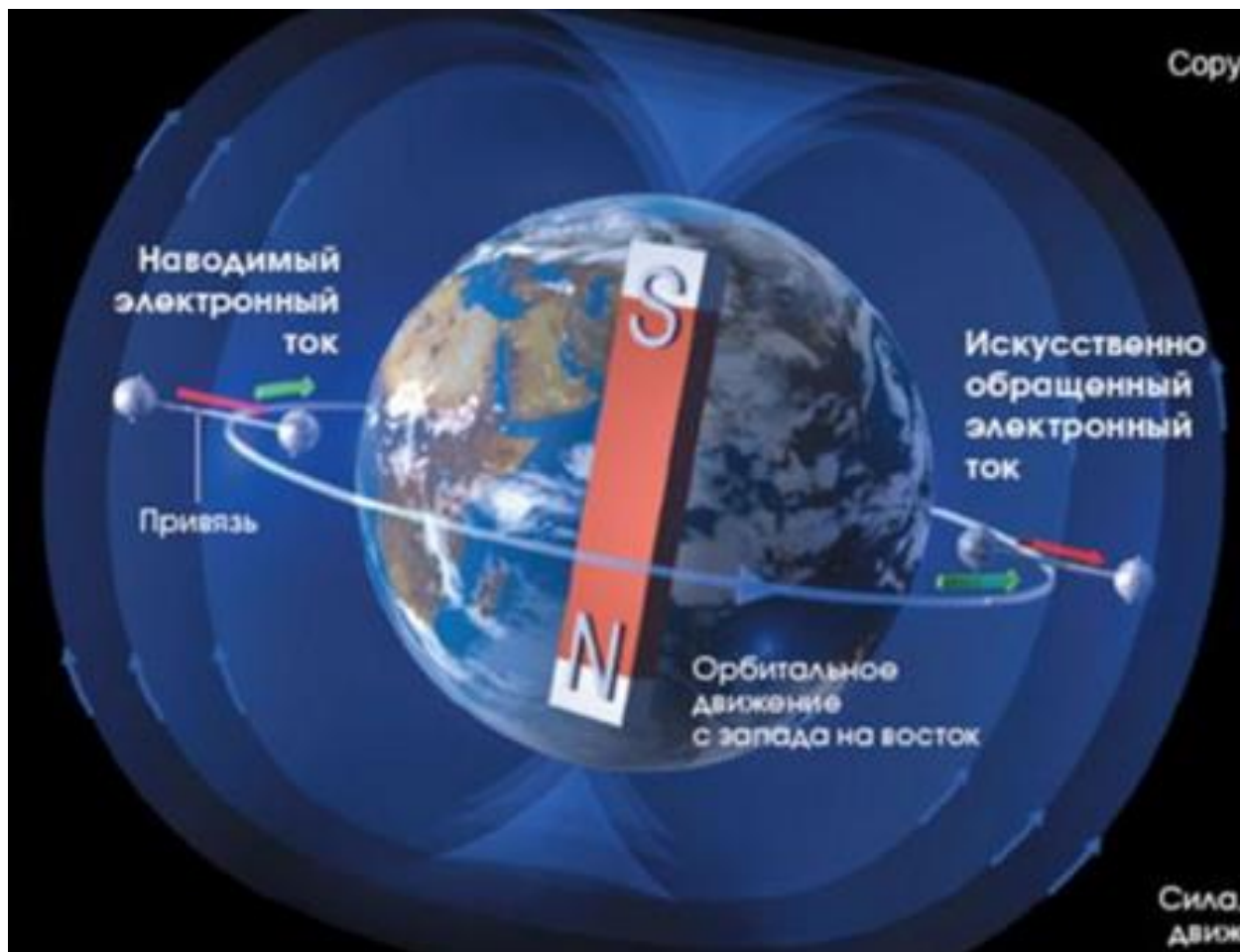
Magnit maydonining superpozitsiya prinsipi



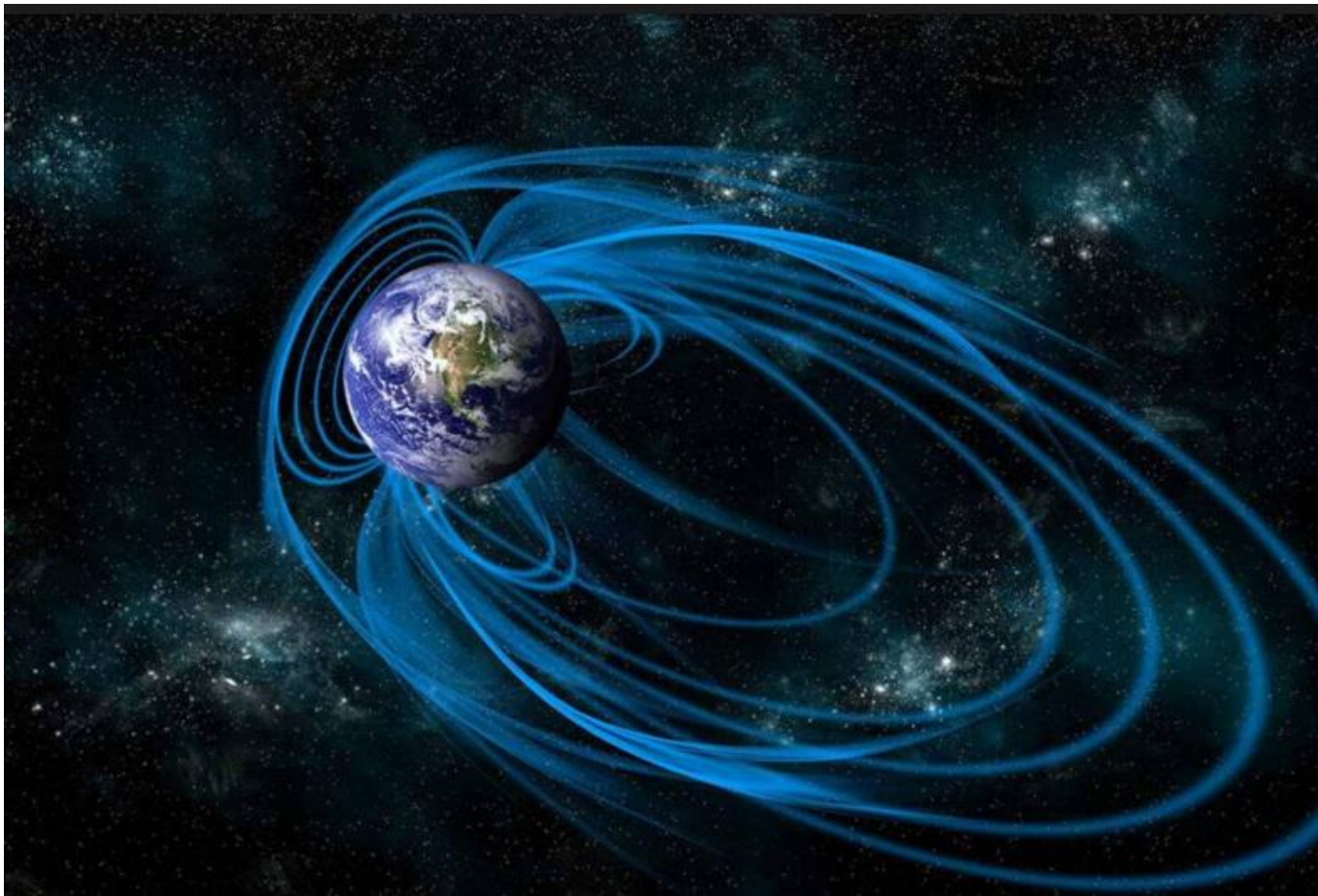
Magnit maydonining superpozitsiya prinsipi



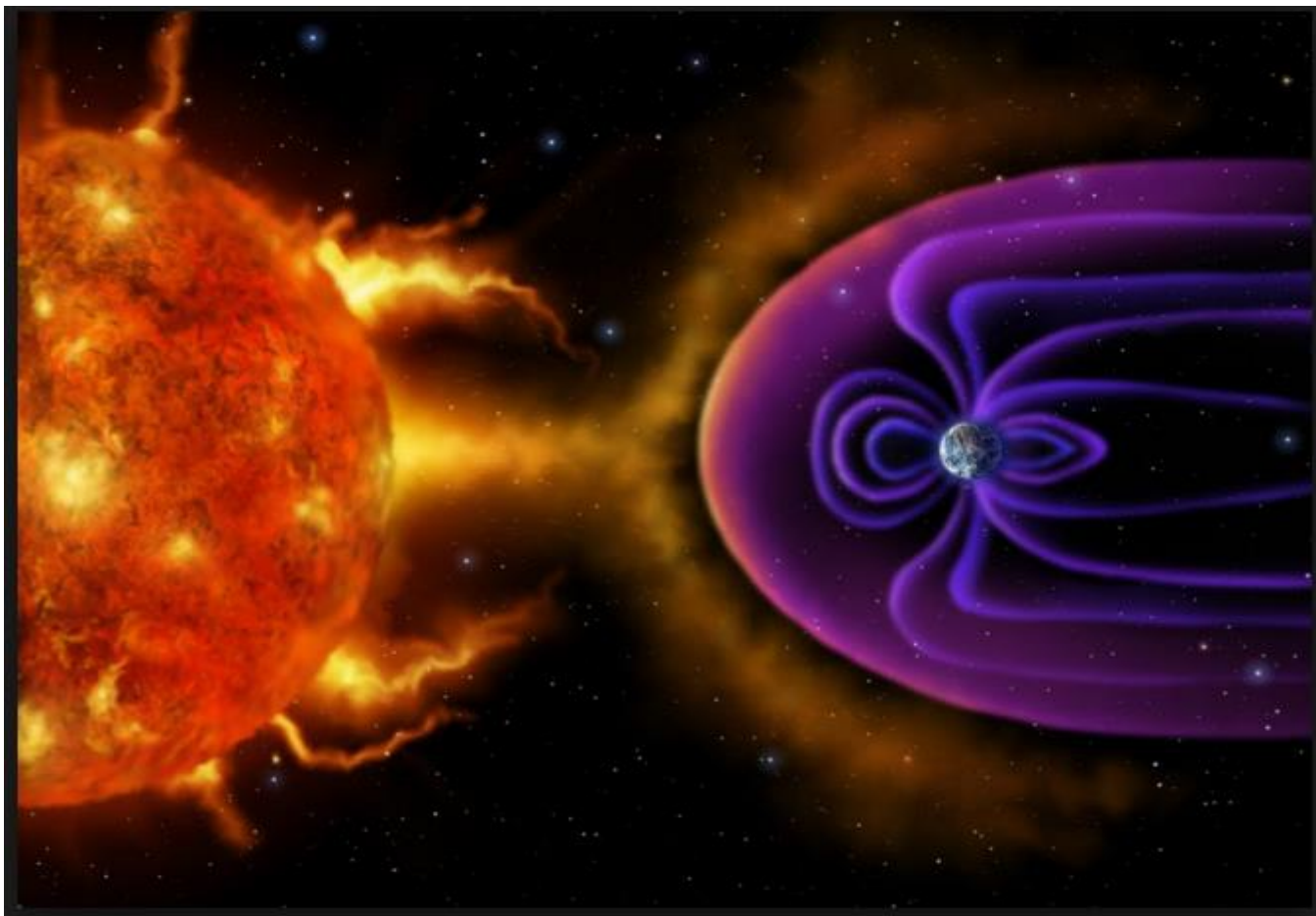
Yer uchun magnit maydonining ahamiyati



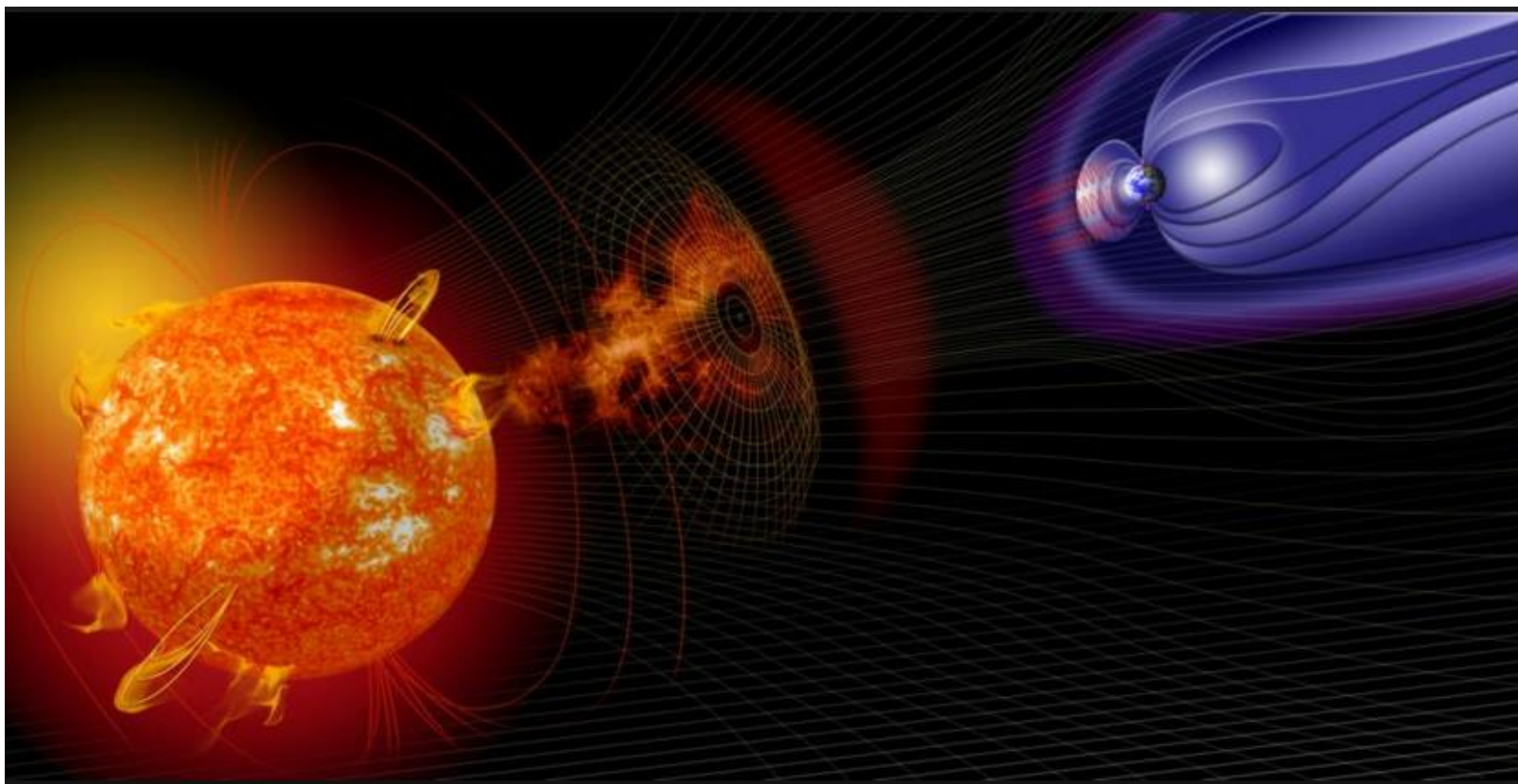
Yer uchun magnit maydonining ahamiyati



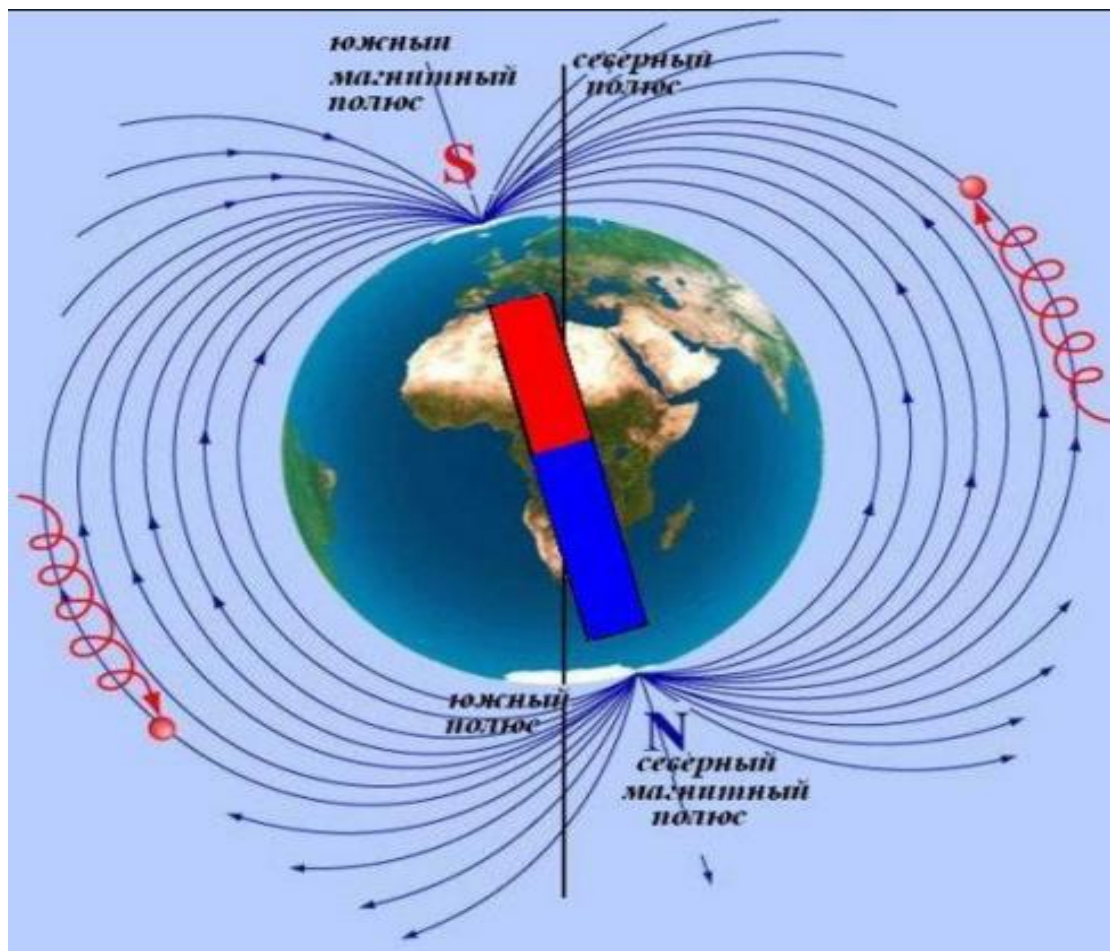
Yer uchun magnit maydonining ahamiyati



Yer uchun magnit maydonining ahamiyati



Yer magnit maydonida zaryadli zarralarning o'gishi



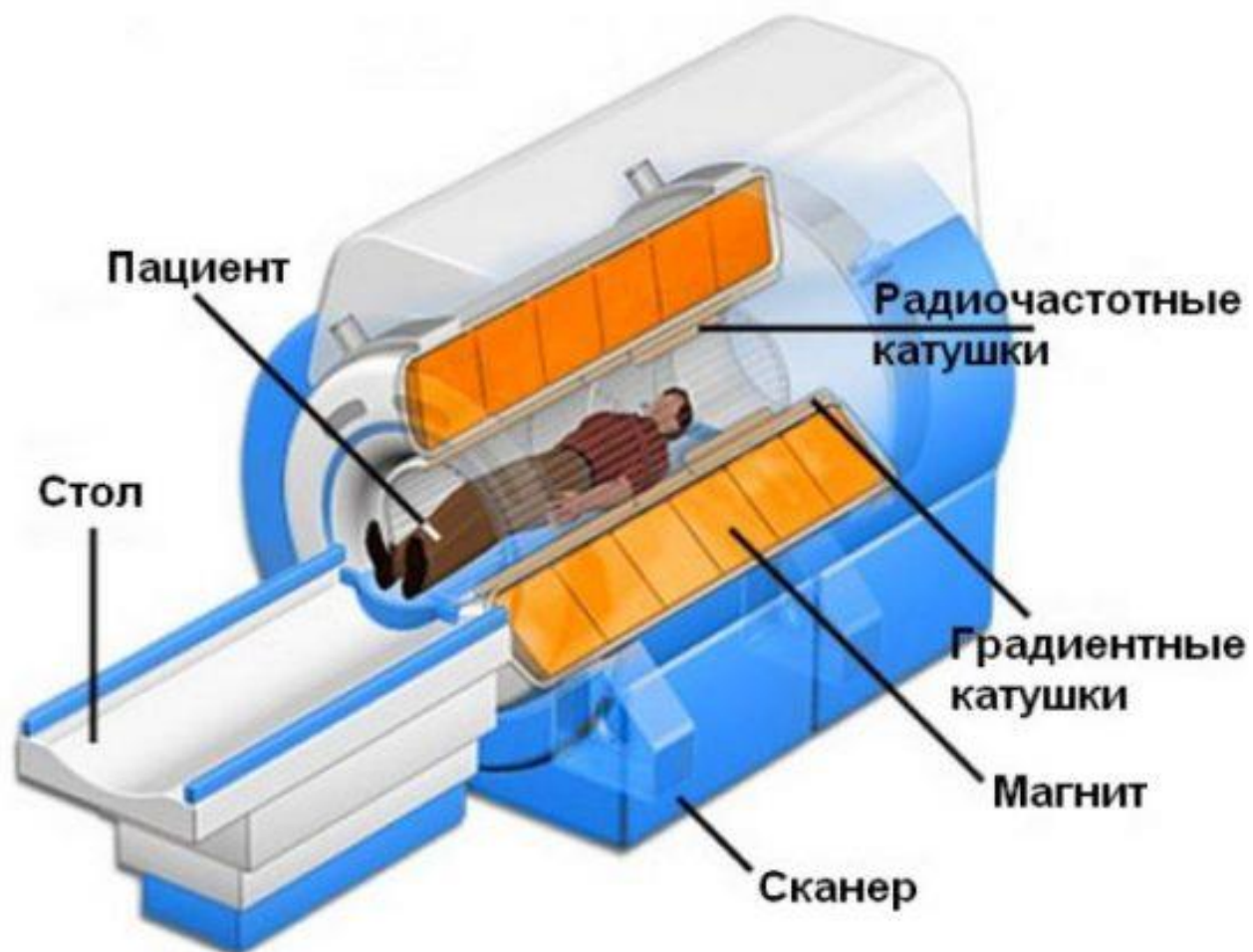
Magnit maydonining fan texnologiyada ahamiyati

- ▶ 1. Barcha turdagi generatorlarni ishlash prinsipi.
- ▶ 2. Barcha GES, IES, AES, SHES larda energiyani elektr energiyasiga aylantirish asosi hisoblanadi.
- ▶ 3. Elektrodvigatellarning asosi
- ▶ 4. Meditsinada MRT, UVCH
- ▶ 5. Va boshqalar

MRT ning tashqi ko'rinishi

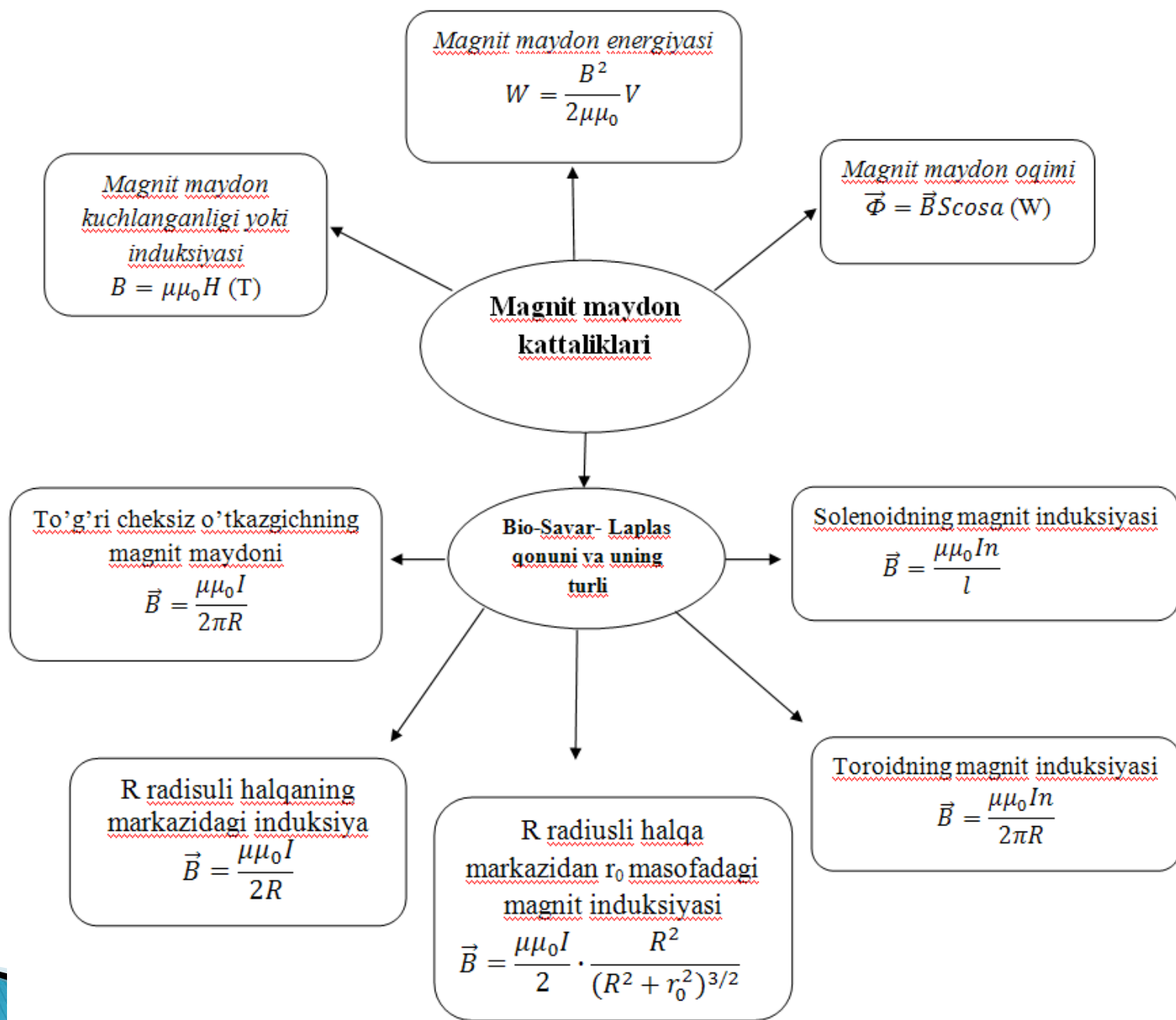


MRT ichki tuzilishi



UVCH (42 MHzs)





O'quvchilarni mavzuni o'zlashtirish darajasini bilish uchun savollar.

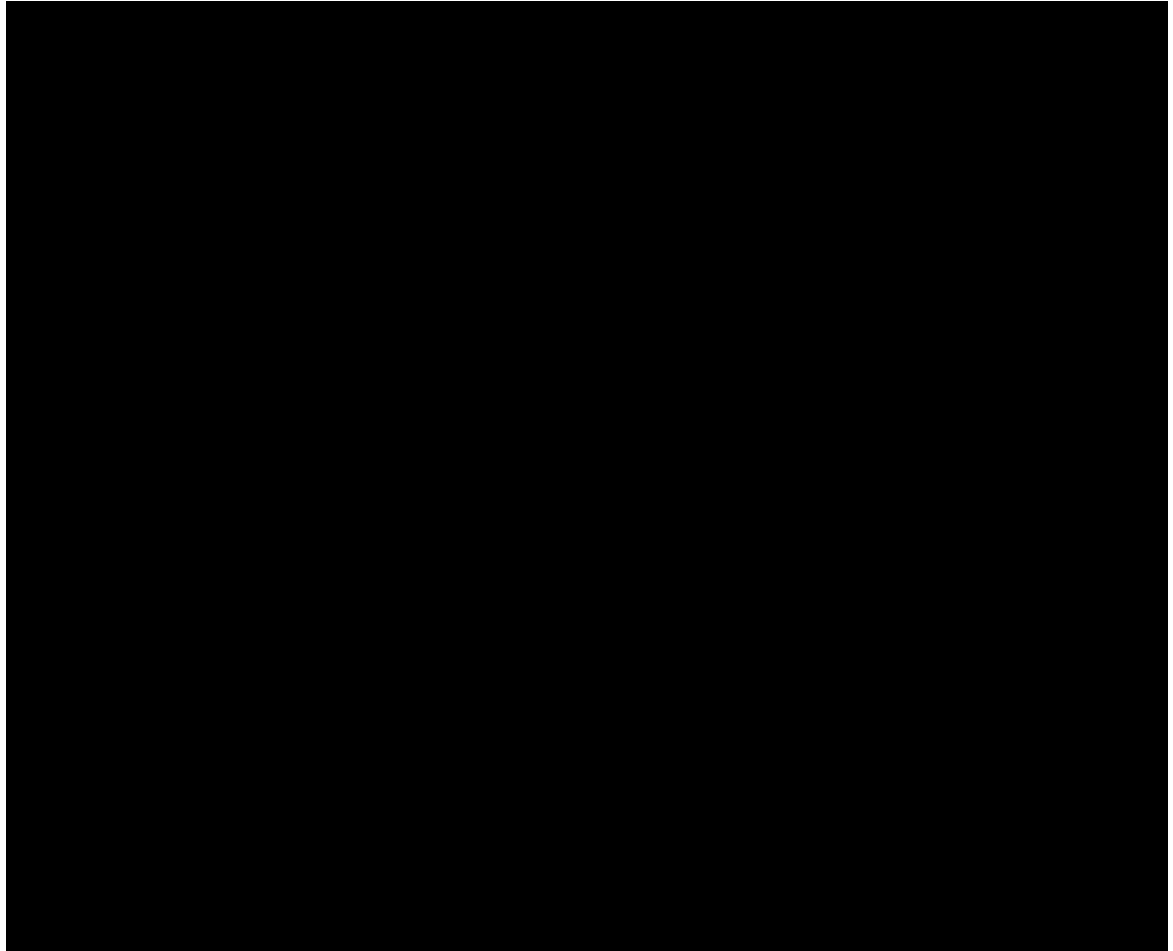
- ▶ 1. Magnit maydon induksiya birligi
- ▶ 2. Magnit maydon kuchlanganlik birligi
- ▶ 3. M.m induksiya va m.m kuchlanganlikni bir-biriga bog'lanish formulasi.
- ▶ 4. Magnit doimiysining qiymati nimaga teng
- ▶ 5. To'g'ri cheksiz o'tkazgichning magnit maydon induksiya formulasi
- ▶ 6. R radiusli harqa markazidagi induksiya formulasi
- ▶ 7. Magnit induksiya yo'nalishini qaysi qoida bilan aniqlanadi.
- ▶ 8. Magnit maydon manbai nimalar.
- ▶ 9. Magnit zarrasi mavjudmi (ha yoki yoq)
- ▶ 10. Yerning magnit qutblari geografik qutblari bilan ustma-ust tushadimi qanchalik farq qiladi.
- ▶ 11. Magnit maydonining superpozitsiya prinsipi deganda nimani tushunasiz.
- ▶ 12. Solenoidning magnit maydon induksiya formulasi.
- ▶ 13. Magnit maydon kuch chiziqlari qanday shaklda
- ▶ 14. Yerning magnit maydonining asosiy vazifasi nimadan iborat.
- ▶ 15. Magnitik moddalarga nimalar kiradi.

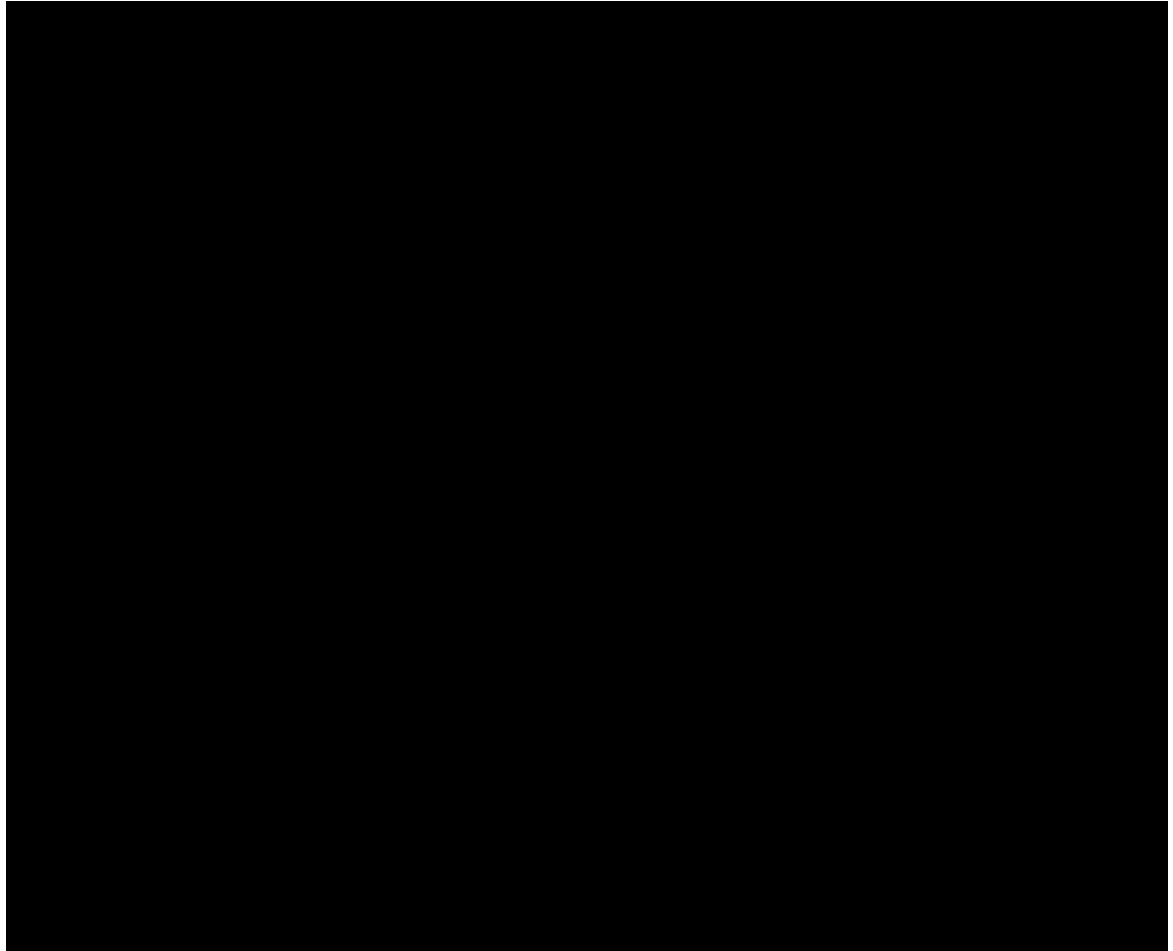
Sinov savollarini javoblar

- ▶ 1. Tesla (T)
- ▶ 2. Amer/metr (A/m yoki ersted)
- ▶ 3. $\vec{B} = \mu\mu_0\vec{H}$
- ▶ 4. $\mu_0 = 4\pi \cdot 10^{-7} \left(\frac{T \cdot m}{A}\right)$ – magnit doimiysi
- ▶ 5. $\vec{B} = \frac{\mu\mu_0 I}{2\pi R}$
- ▶ 6. $\vec{B} = \frac{\mu\mu_0 I}{2R}$
- ▶ 7. O'ng parma qoidasi bilan
- ▶ 8. Elektr toki (zaryadli zarralarni tartibli harakati)
- ▶ 9. Mavjud emas (yoq)
- ▶ 10. Ustma-ust tushmaydi (11.6° ga farq qiladi.)
- ▶ 11. Ixtiyoriy magnit manbalarining malum bir nuqtada hosil qilgan yig'indi magnit induksiyasini qiymati. $\vec{B} = \vec{B}_1 + \vec{B}_2 + \dots + \vec{B}_n$
- ▶ 12. $\vec{B} = \mu\mu_0 In/l$
- ▶ 13. Yopiq uyurma shaklida
- ▶ 14. Kosmosdan katta tezlikda keluvchi zaryadli zarralar oqimini yo'nalishini o'zgartiradi. Shu bilan biologik organizmni koinot zarralaridan himoyalaydi.
- ▶ 15. Temir, po'lat, cobalt, nikel, marganets, magniy.

Foydalanilgan adabiyotlar va manbalar.

- ▶ 1.R.I. Grabovskiy Fizika kursi.
- ▶ 2. I.Savelev Fizikadan maruza.
- ▶ 3. M.H. O'lmasova Maruzalar matni
- ▶ 4. Иродов И.Е. т.3. Основные законы электромагнетизма. (2-е изд, 1991)
- ▶ 5. Матвеев А.Н. (Курс общей физики. Т. 3) Электричество и магнетизм. (1983.)
- ▶ 6. Савельев И.В. Курс общей физики. Т.2. Электричество и магнетизм. Волны. Оптика. (2-е изд., 1982)
- ▶ 7. Сивухин Д.В. Общий курс физики. В 5 томах. Том III. Электричество. (4-е изд., 2004)
- ▶ 8. Internet malumotlari.





**E'tiboringiz uchun
rahmat**

Uyga vazifa

- ▶ 1. Bio-Savar- Laplas formulasining tadbiqlarini o'rganib kelish
- ▶ 2. To'g'ri cheksiz o'tkazgich uchun keltirib chiqarish
- ▶ 3. R radiusli halqa uchun chiqarish
- ▶ 4. Solenoid va toroidlar uchun keltirib chiqarish
- ▶ 5. To'plamdan tegishli masalalar ko'rib kelish.