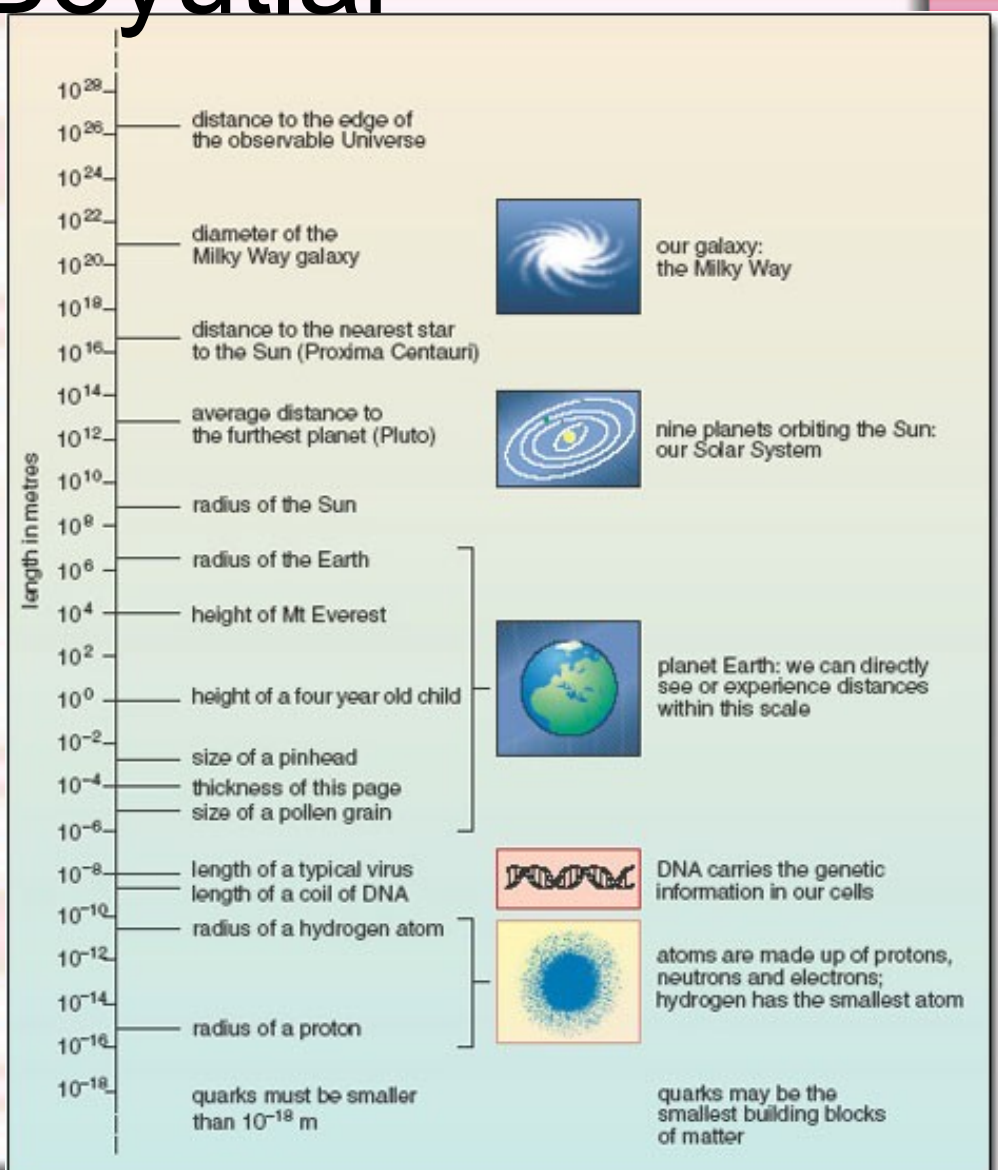
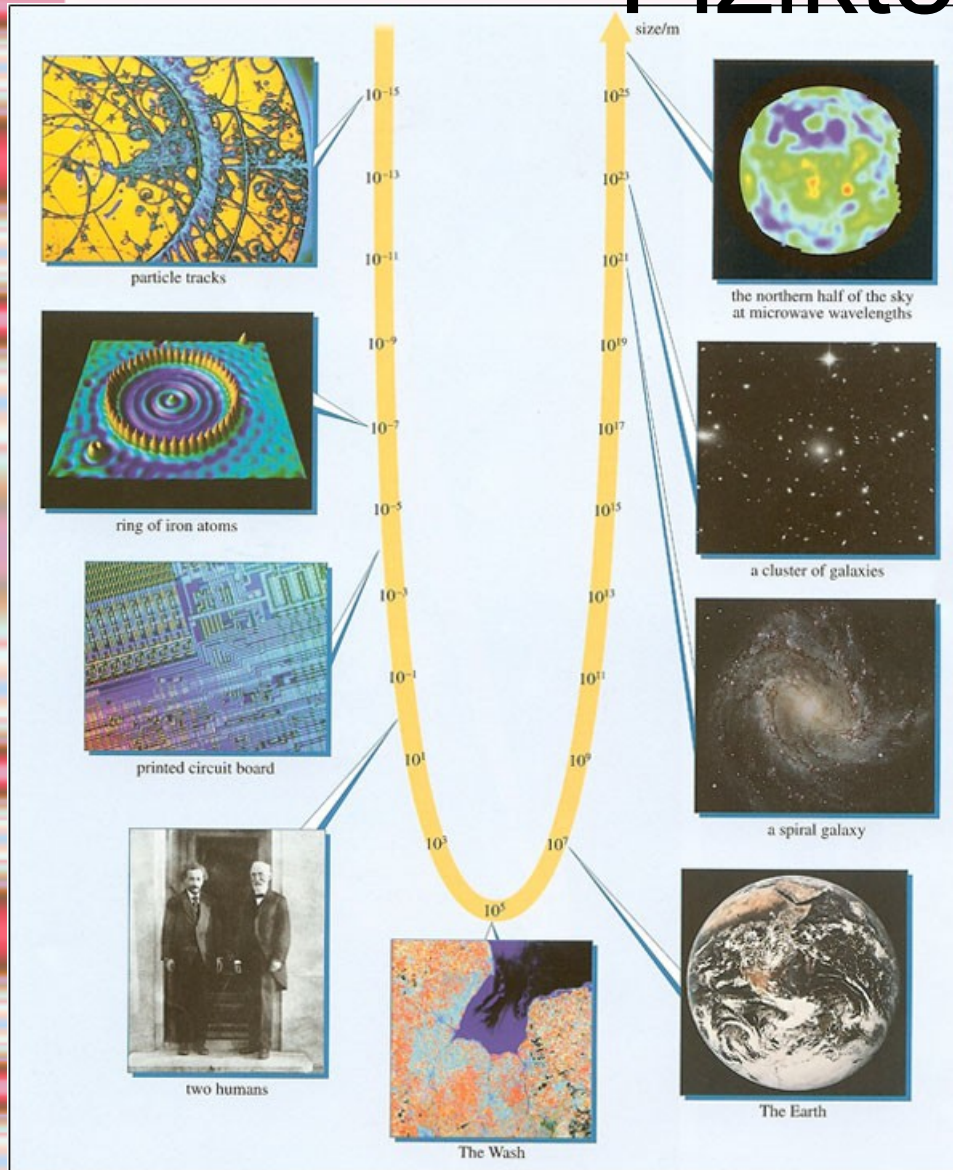


En Büyüklerin ve En Küçüklerin Fiziği

Doç. Dr. Altuğ Özpineci
ODTÜ Fizik Bölümü
ozpineci@metu.edu.tr

Fizikte Boyutlar



Mersin



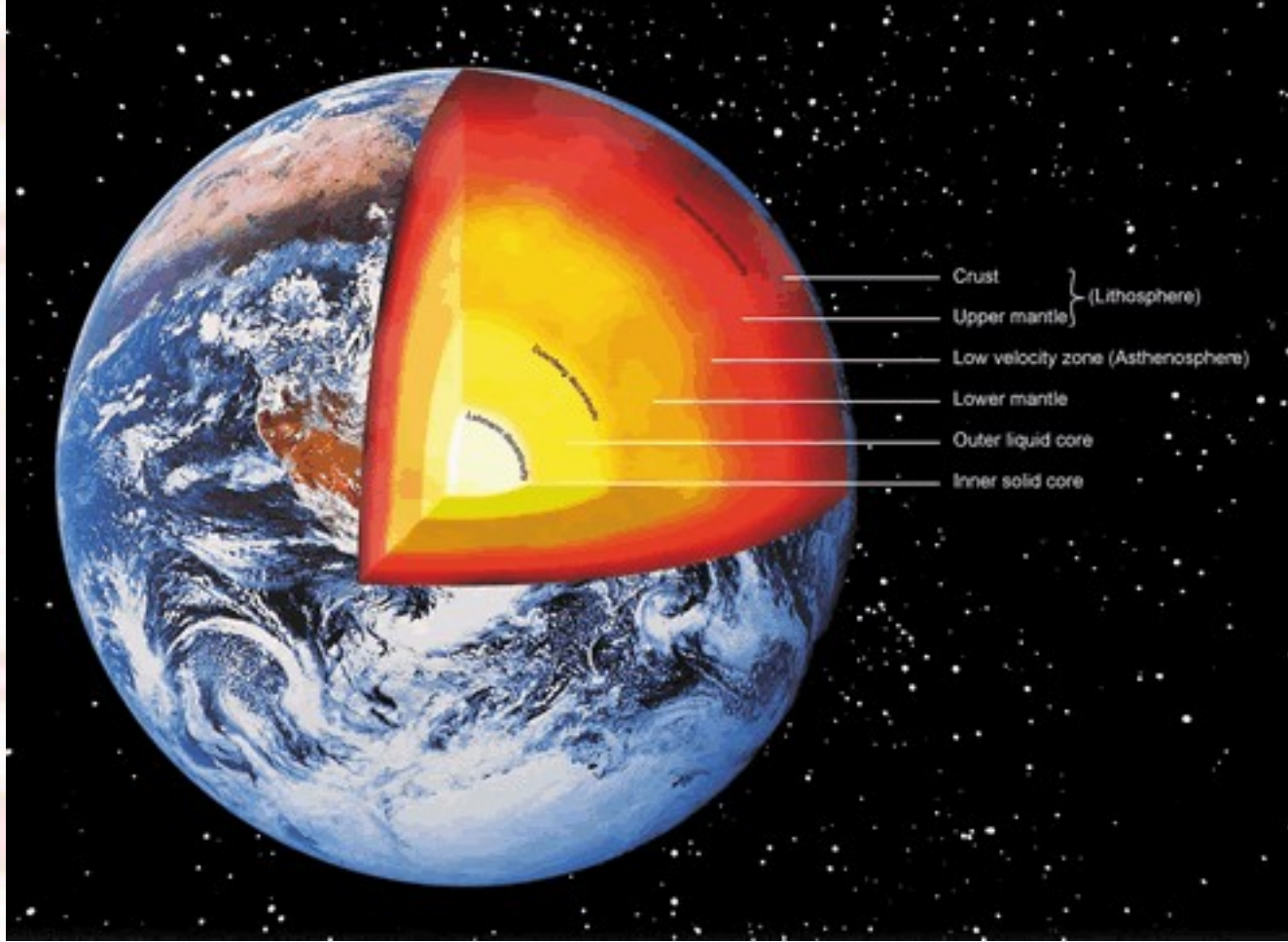
Uzaydan Trkiye



Dünyanın Doğuşu 10^4 km

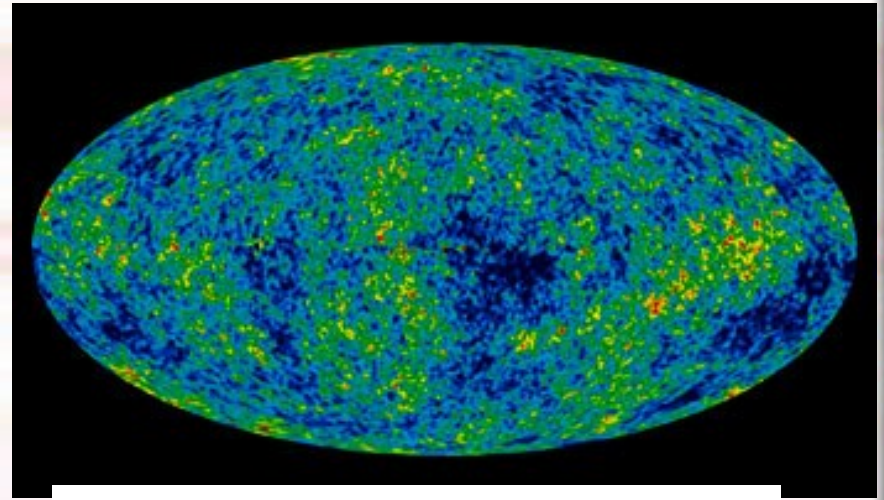


Dünyanın İçi

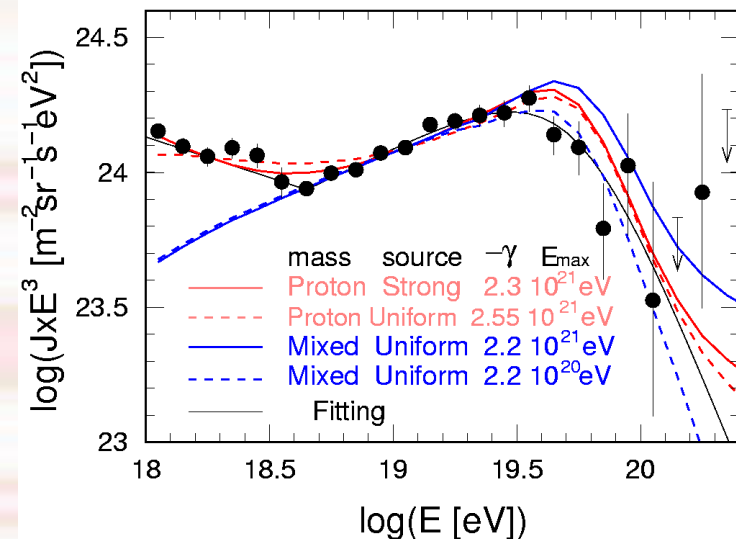


Kozmik Işıklar

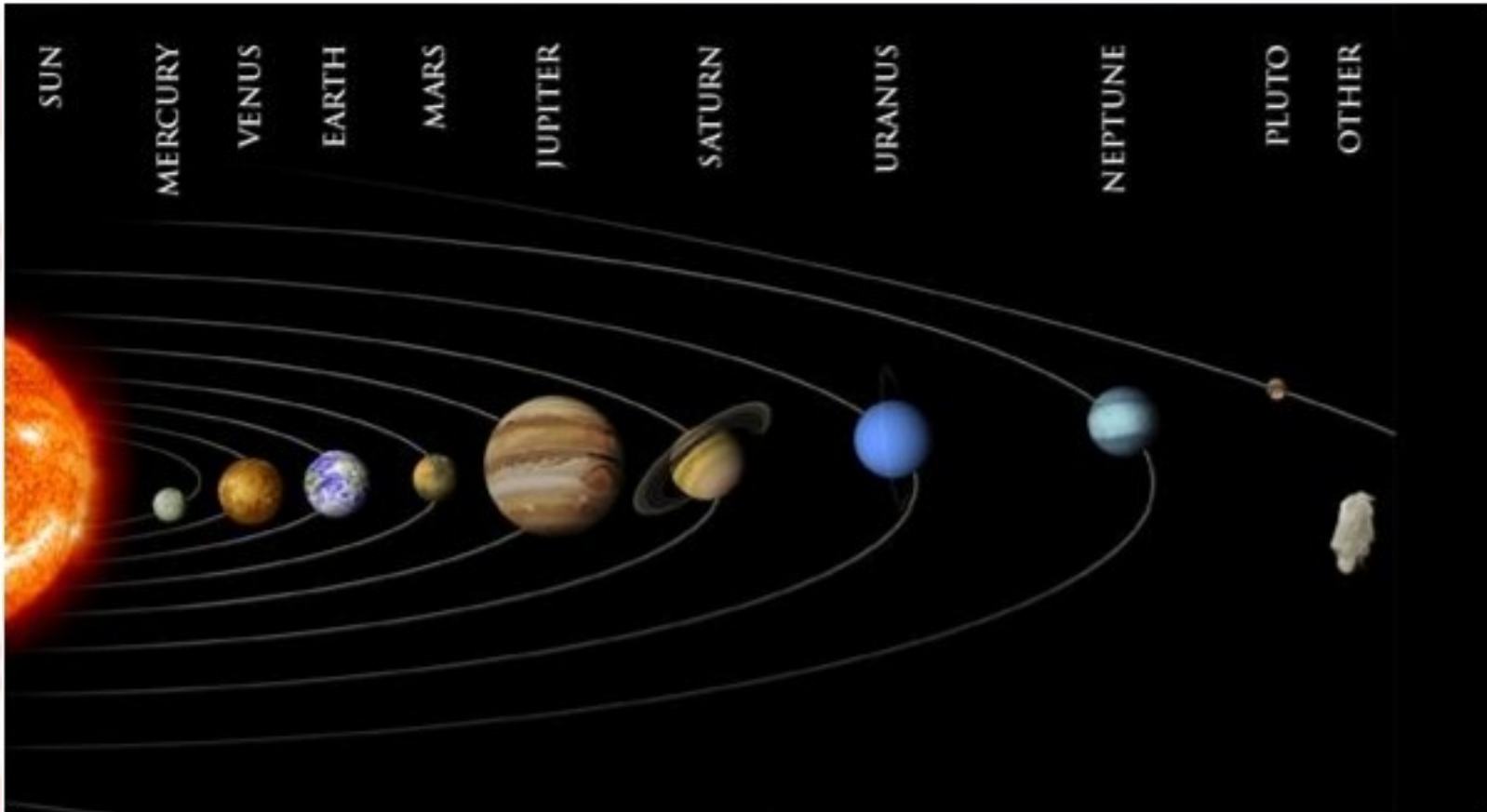
Kozmik Mikrodalga
Işıması



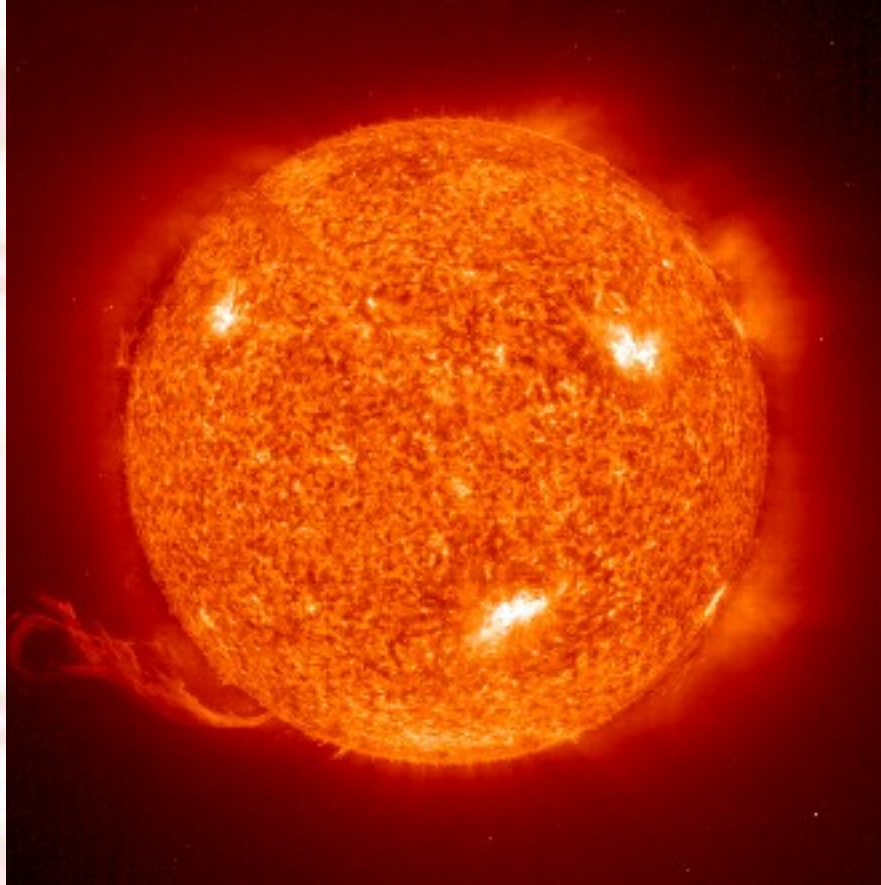
Ultra Yüksek Enerjili
Kozmik Işıklar



Güneş Sistemi 10^9 km



Bir Yıldız: Güneşimiz 10^6 km

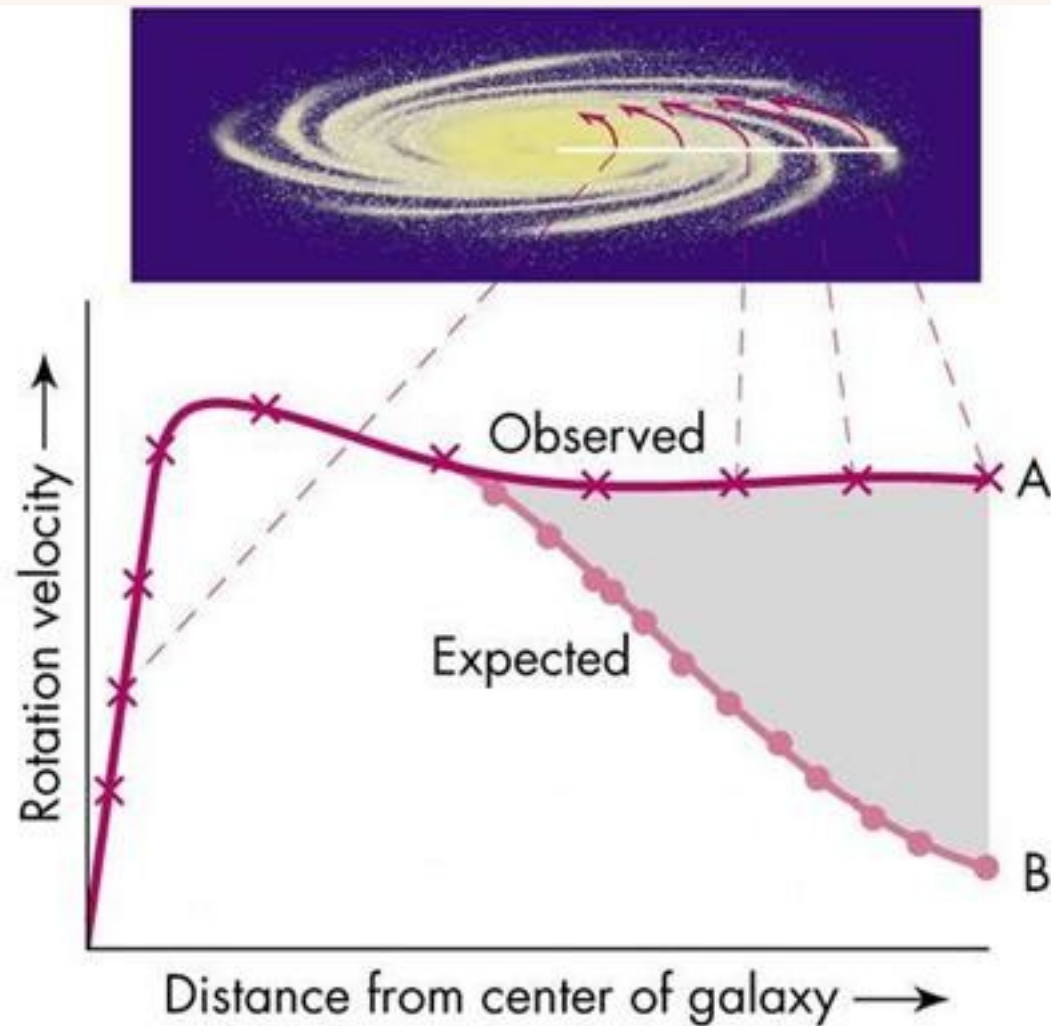


Andromeda Galaksisi

- 10^6 ışık yılı uzaklıkta
- 10^5 ışık yılı genişlikte



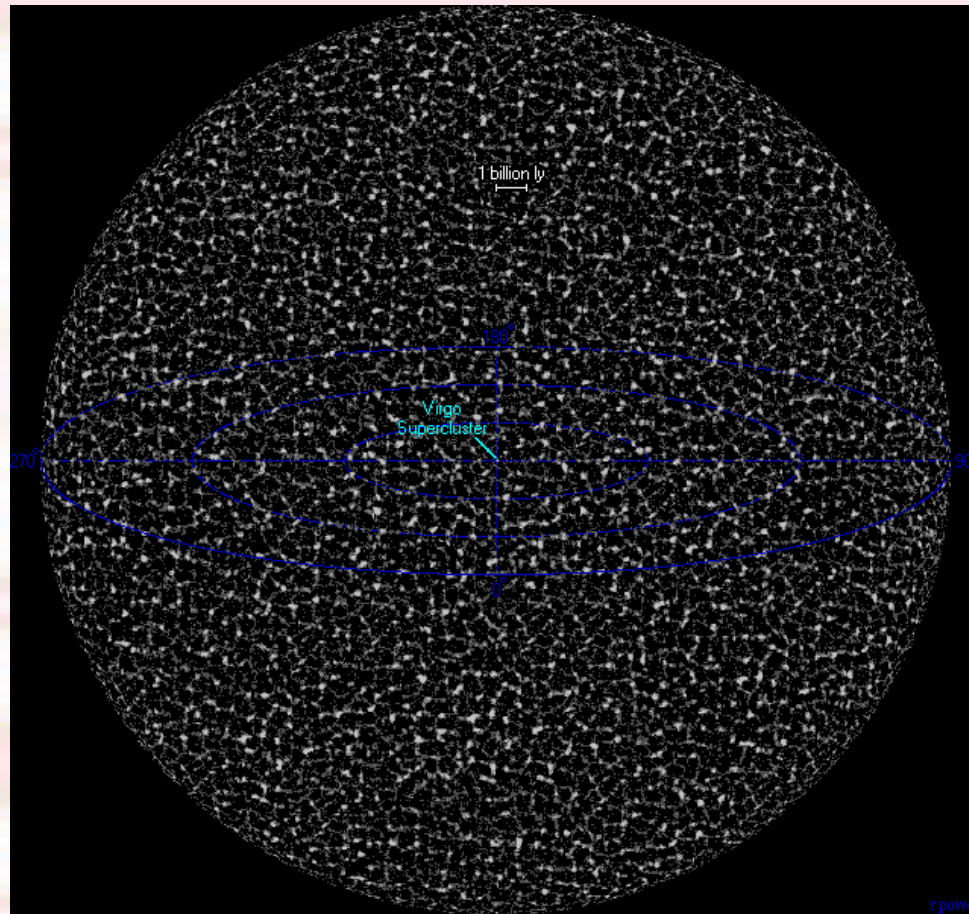
Karanlık Madde?



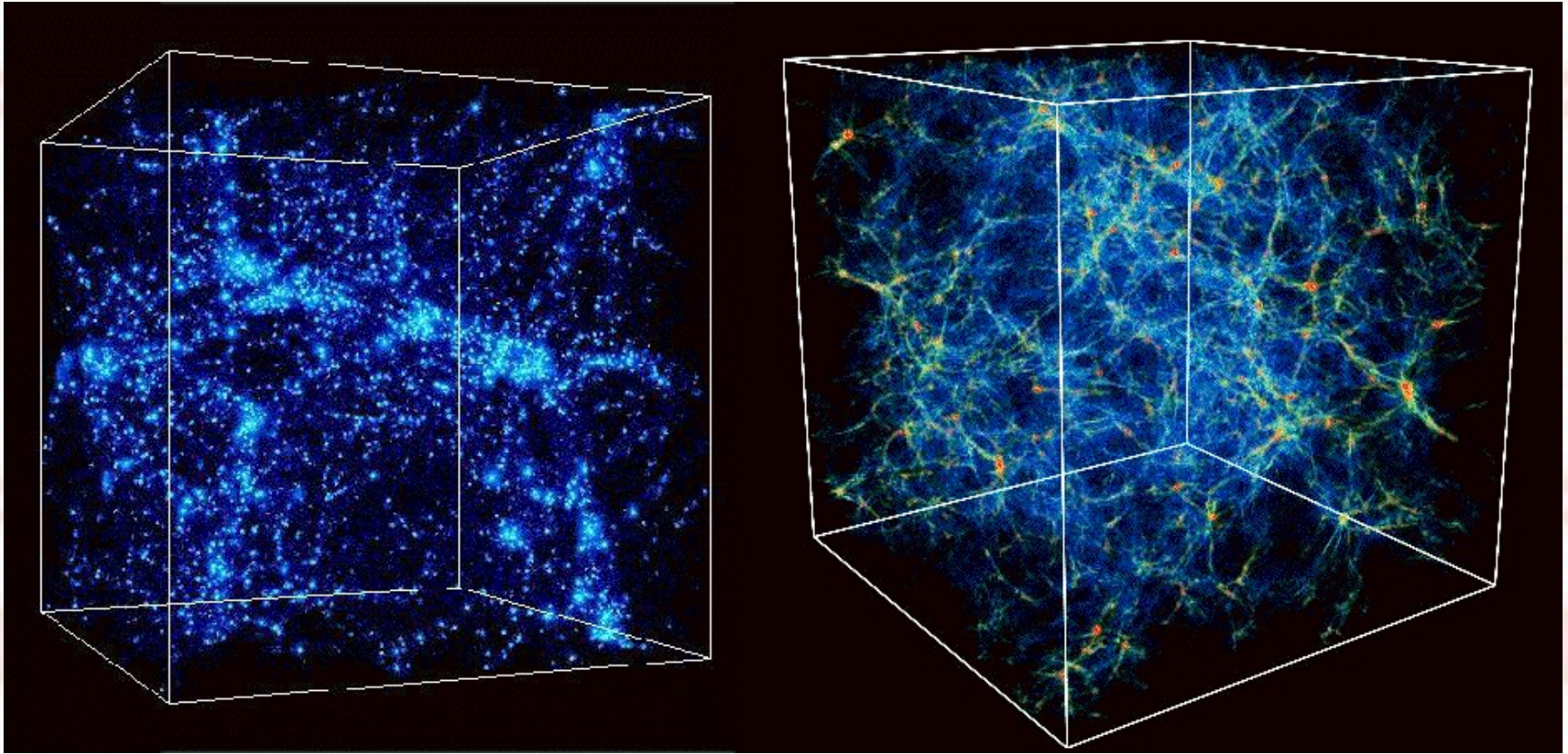
Galaksi Kümeleri: 10^{10} LY



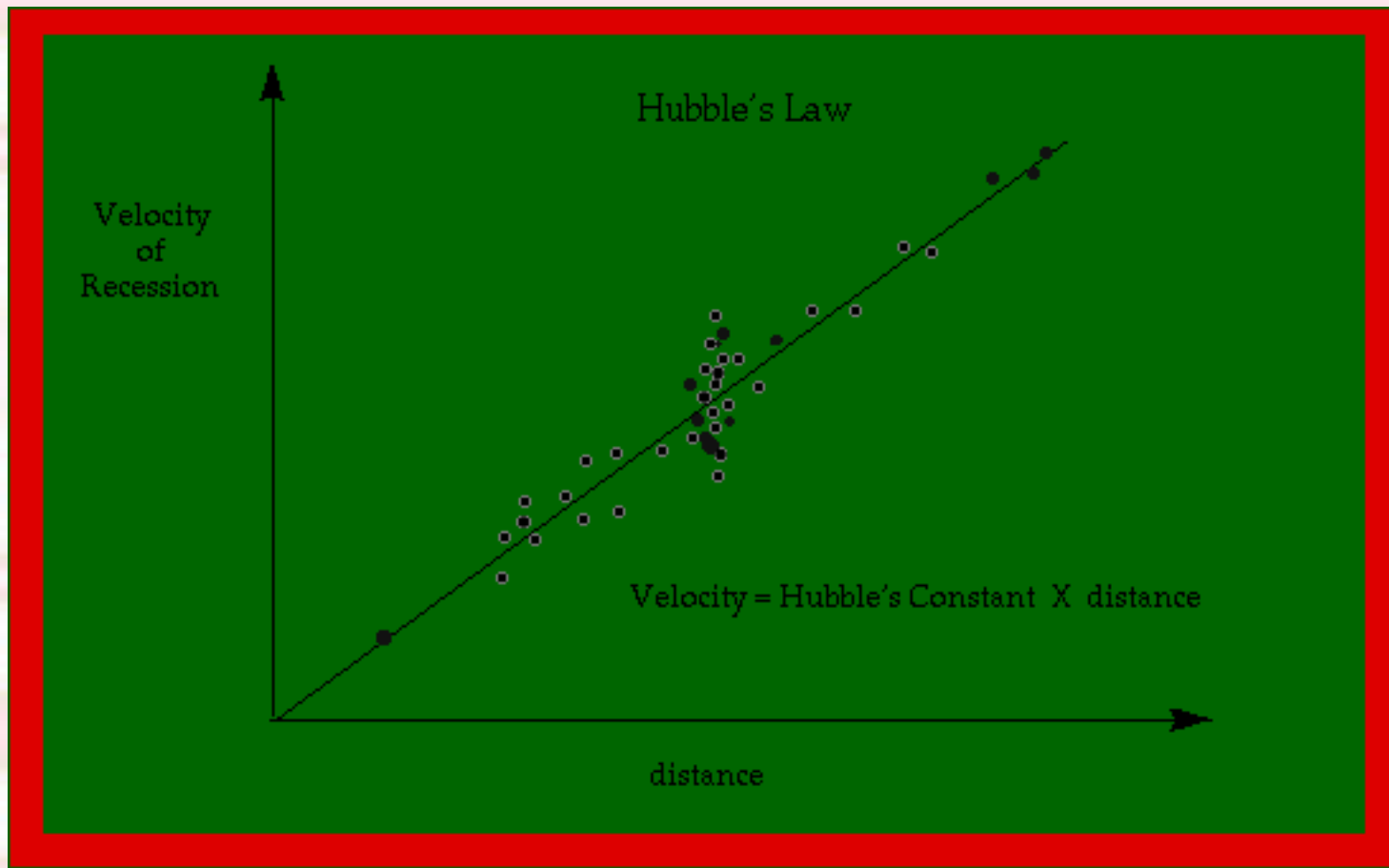
Bilinen Evren: 10^{10} LY



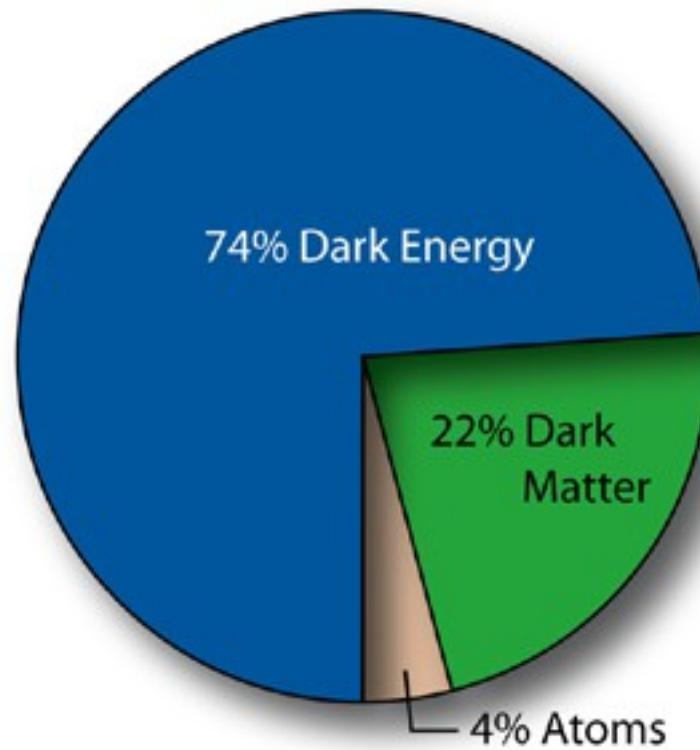
Galaksi Oluşum Modelleri



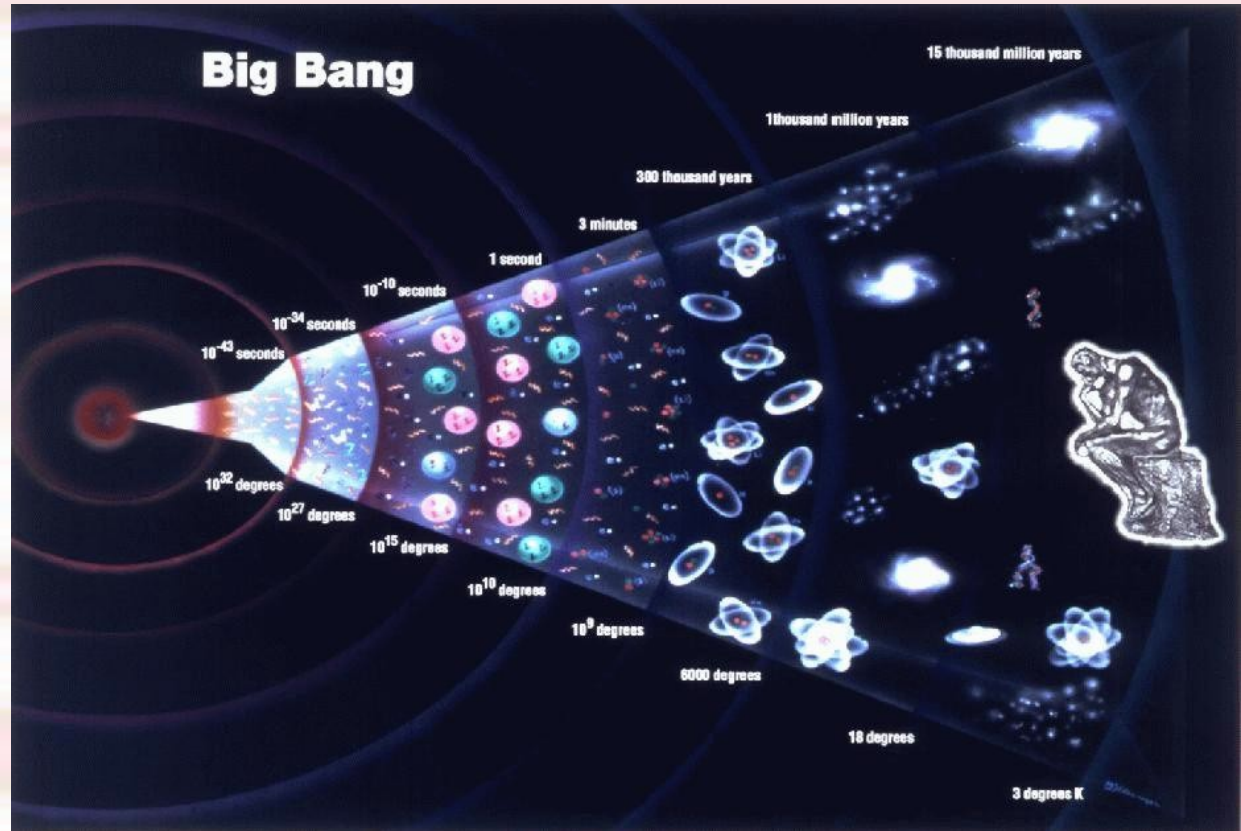
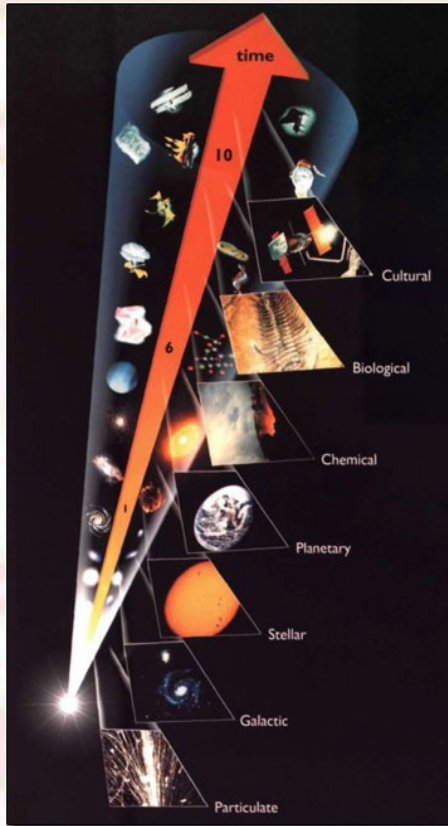
Bütün Galaksiler Bizden Uzaklaşıyorlar-Karanlık Enerji

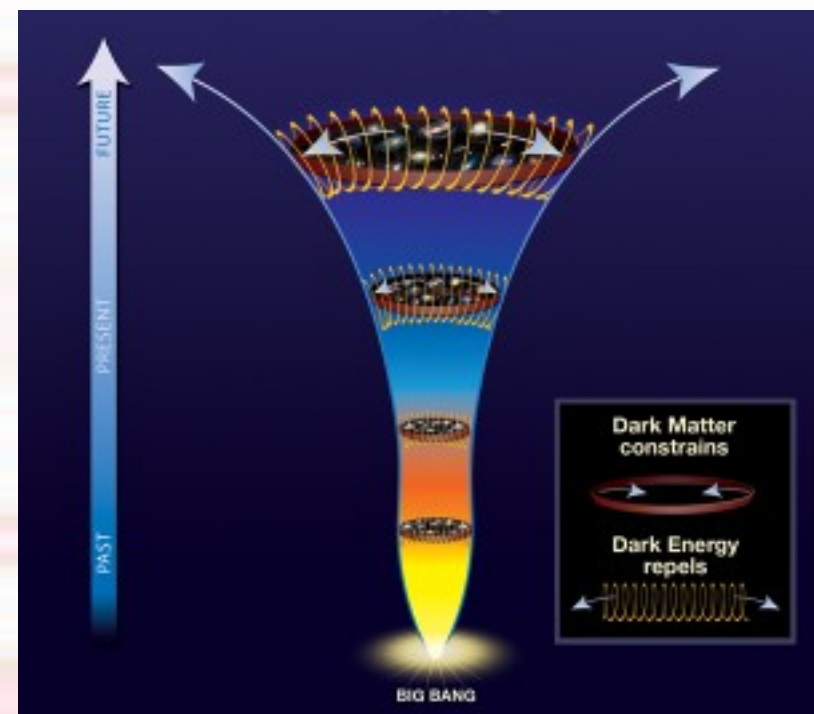
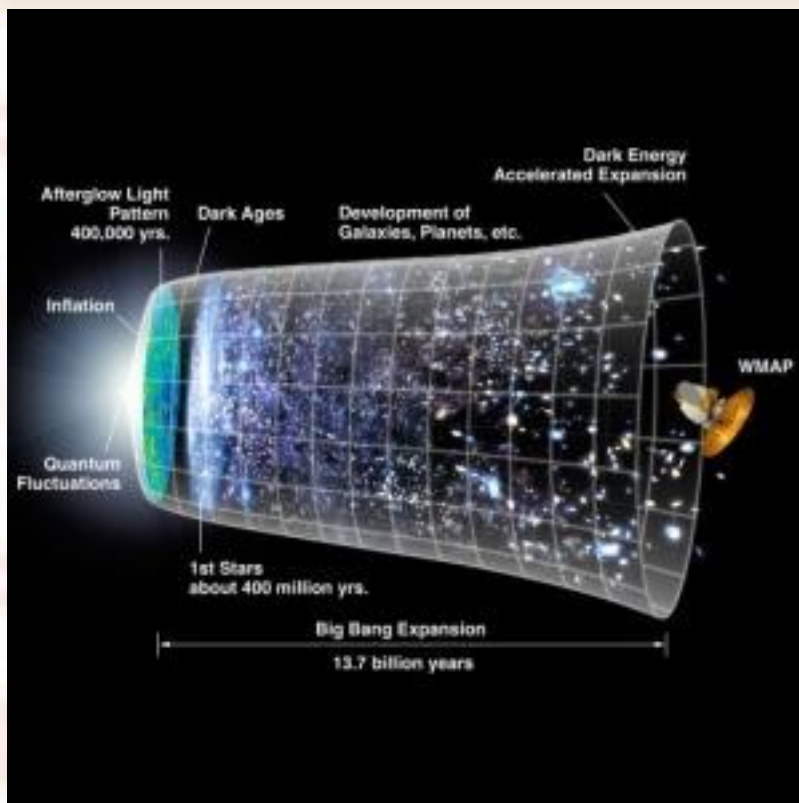


Evrendeki Enerji Dağılımı

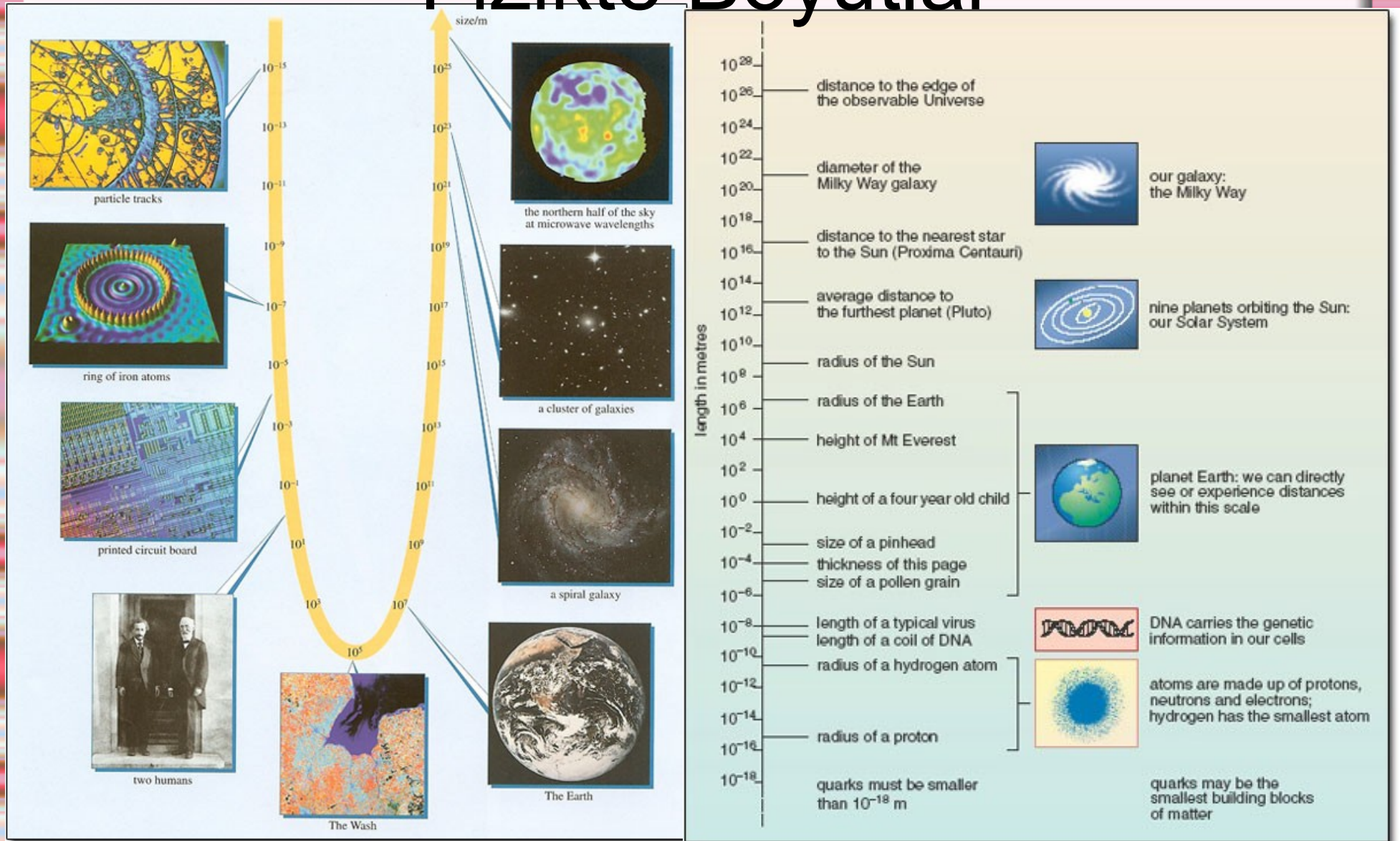


Evrenin Tarihi

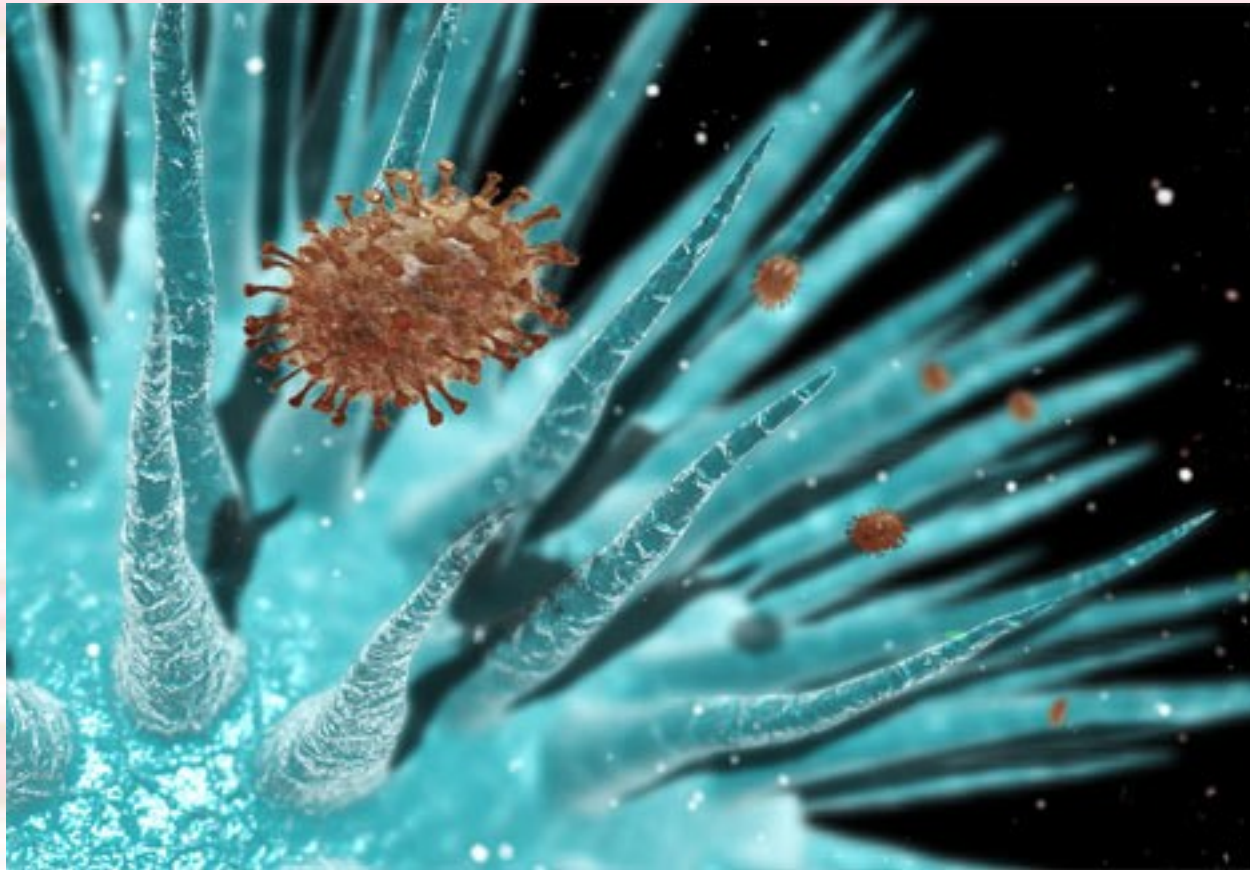




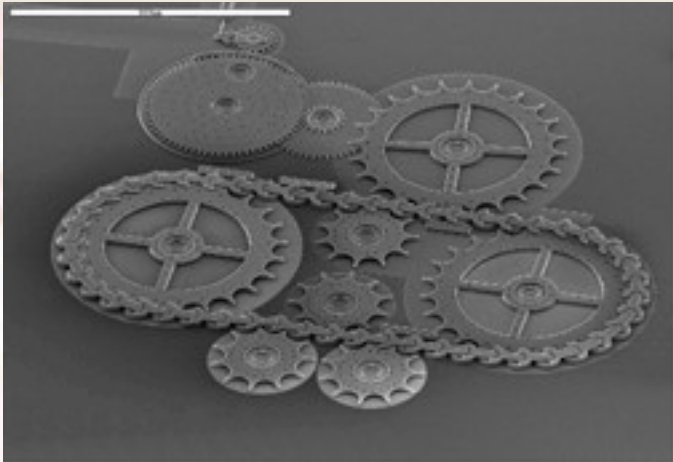
Fizikte Boyutlar



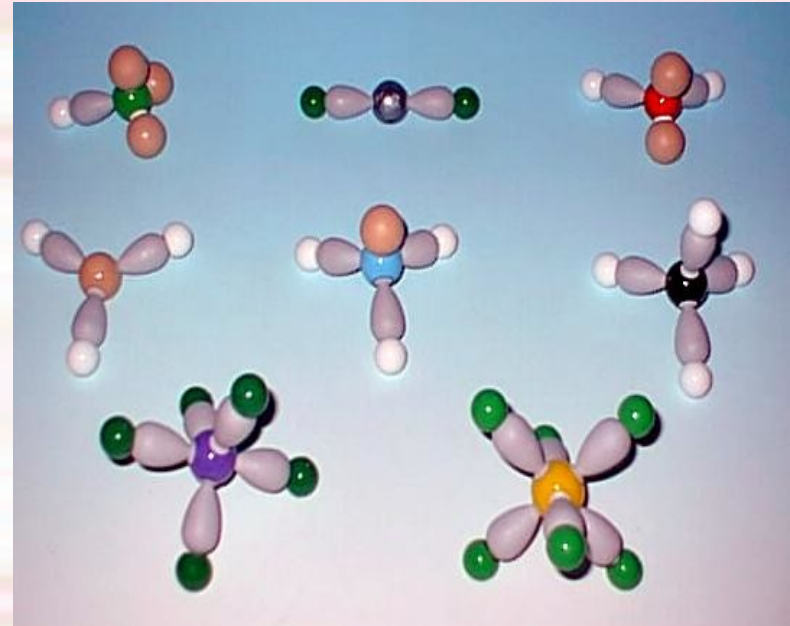
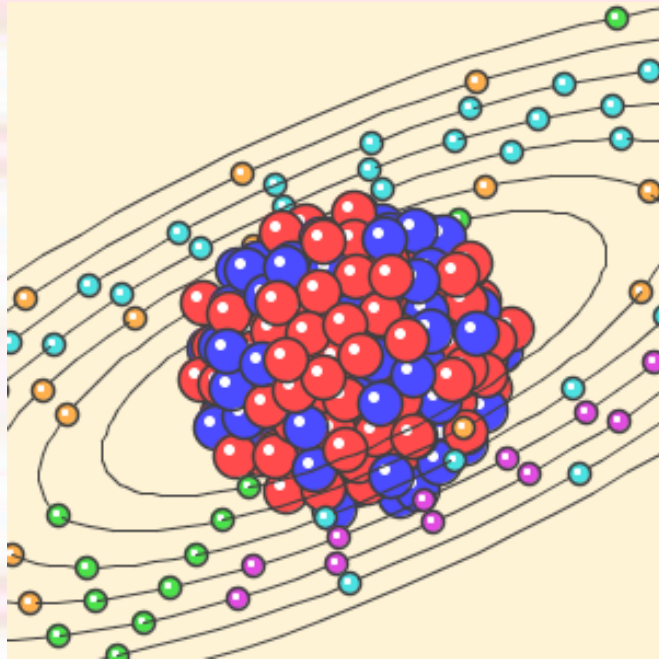
Grip Virüsü: 10^{-7} m



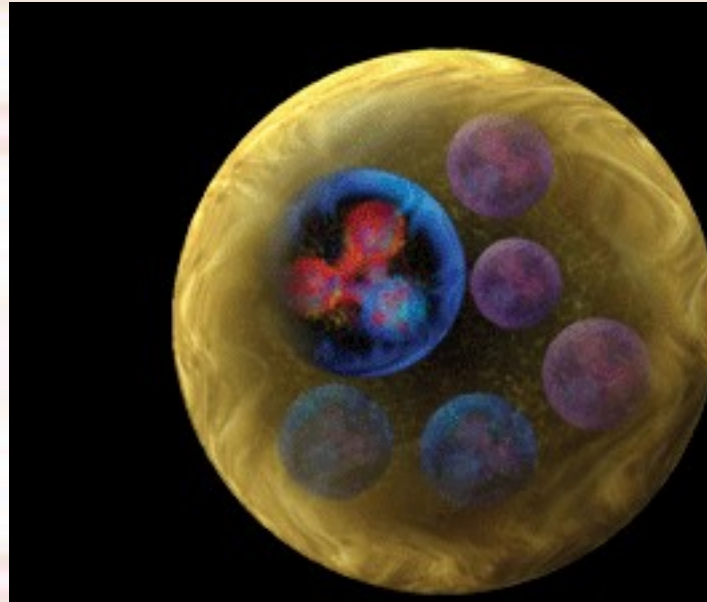
Nanoteknoloji



Atom 10^{-10}m



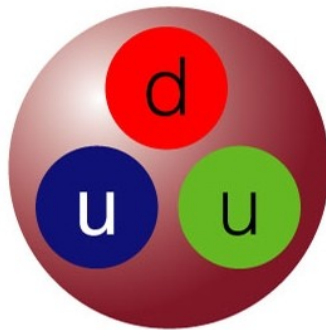
Atom Çekirdeđi: 10^{-15}m



Proton ve Nötron'un İçinde:

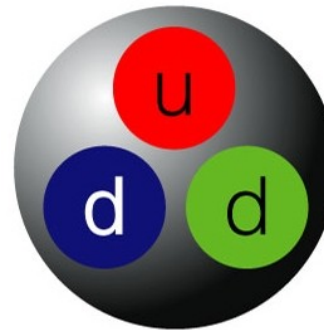
Kuarklar: $<10^{-18}\text{m}$

A proton is composed of 2 up quarks (u) and 1 down quark (d).



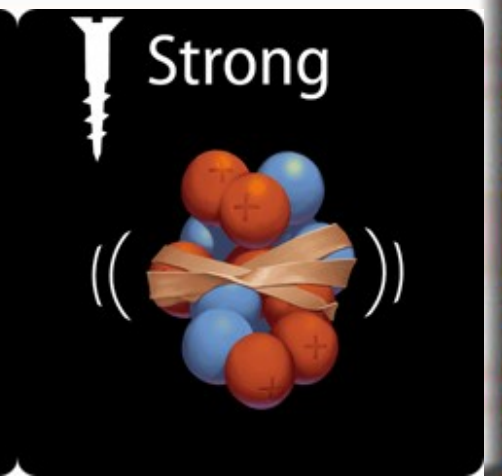
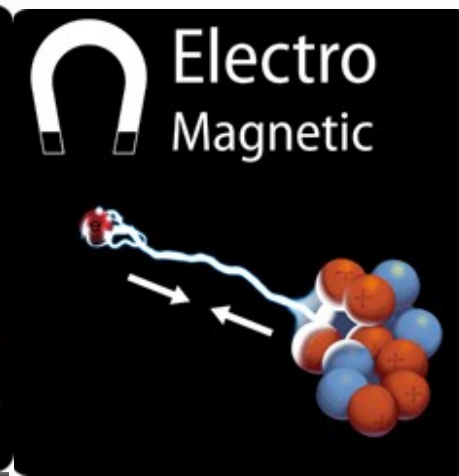
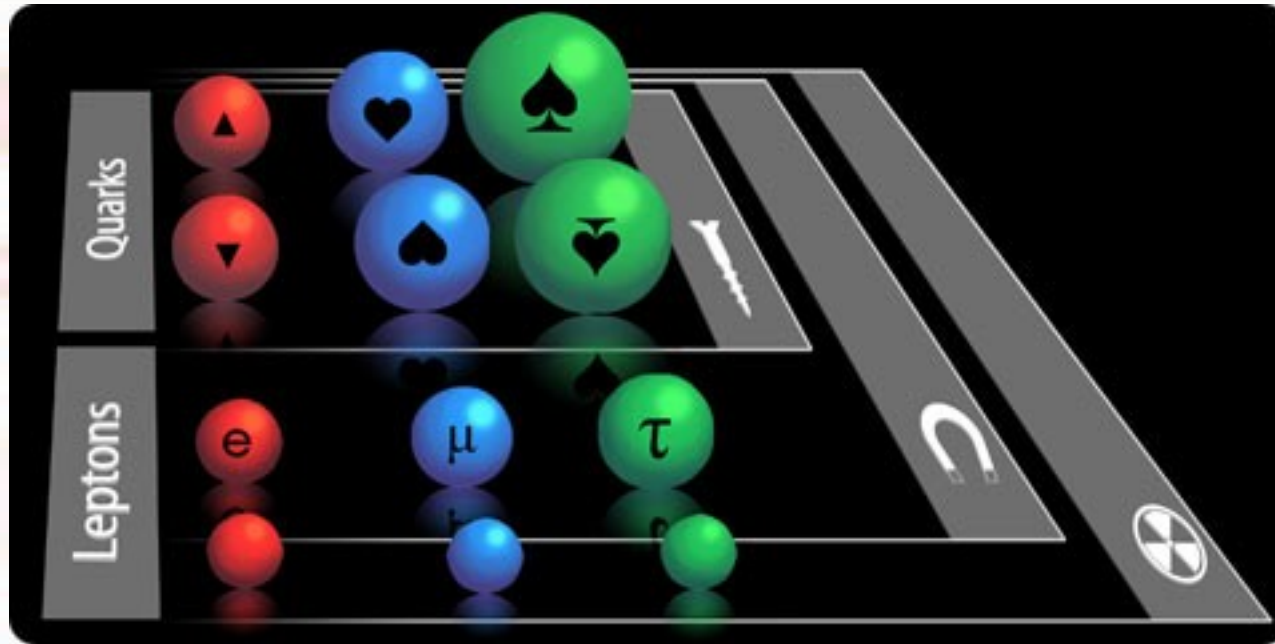
Total charge:
 $+ 2/3 + 2/3 - 1/3 = +1$

A neutron is composed of 1 up quark (u) and 2 down quarks (d).



Total charge:
 $+ 2/3 - 1/3 - 1/3 = 0$

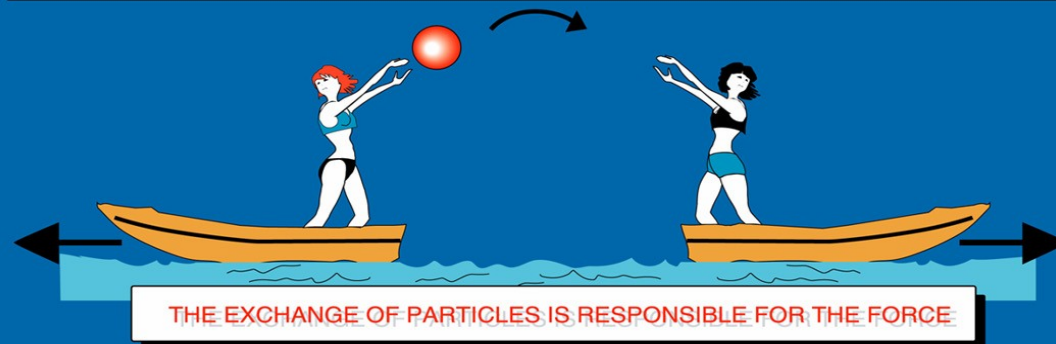
Temel Parçacıklar ve Kuvvetler



Temel Kuvvetler/Etkileşimler

The forces in Nature

TYPE	INTENSITY OF FORCES (DECREASING ORDER)	BINDING PARTICLE (FIELD QUANTUM)	OCCURS IN :
STRONG NUCLEAR FORCE	~ 1	GLUONS (NO MASS)	ATOMIC NUCLEUS
ELECTRO -MAGNETIC FORCE	$\sim 10^{-3}$	PHOTONS (NO MASS)	ATOMIC SHELL ELECTROTECHNIQUE
WEAK NUCLEAR FORCE	$\sim 10^{-5}$	BOSONS Z^0, W^+, W^- (HEAVY)	RADIOACTIVE BETA DESINTEGRATION
GRAVITATION	$\sim 10^{-38}$	GRAVITONS (?)	HEAVENLY BODIES



LHC RAP