

Rules of the Game

7 questions, each with 4 answers to choose from (A, B, C, D).

Mark your answer on your answer sheet before the timer ends.

We will then reveal the correct answer.

If you have answered correctly you may tick off the next energy level.

Quiz Answersheet

1 A. B.
C. D.

2 A. B.
C. D.

3 A. B.
C. D.

4 A. B.
C. D.

5 A. B.
C. D.

6 A. B.
C. D.

7 A. B.
C. D.

Your score
Tick off one energy step for each correctly answered question, starting at the bottom

7 TeV
Full beam energy of the LHC

172.9 GeV
Mass of the top quark

91.2 GeV
Mass of the Z boson

938.3 MeV
Mass of the proton

105.7 MeV
Mass of the muon

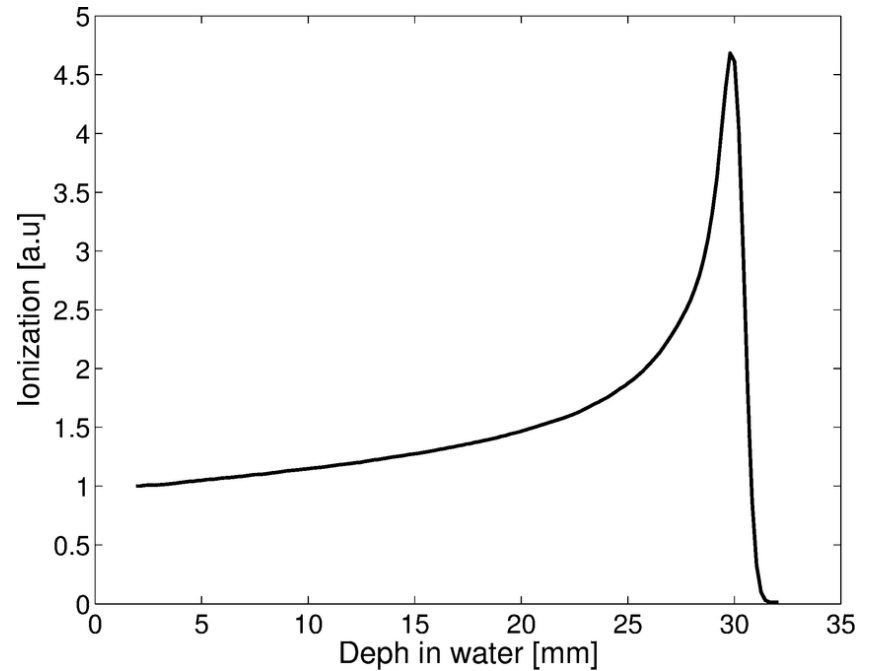
2.5 MeV
Mass of the up quark

0.511 MeV
Mass of the electron

Let's see which energy level you can reach!

Really?

Which physical principle
is
important for Hadron
Therapy?



1

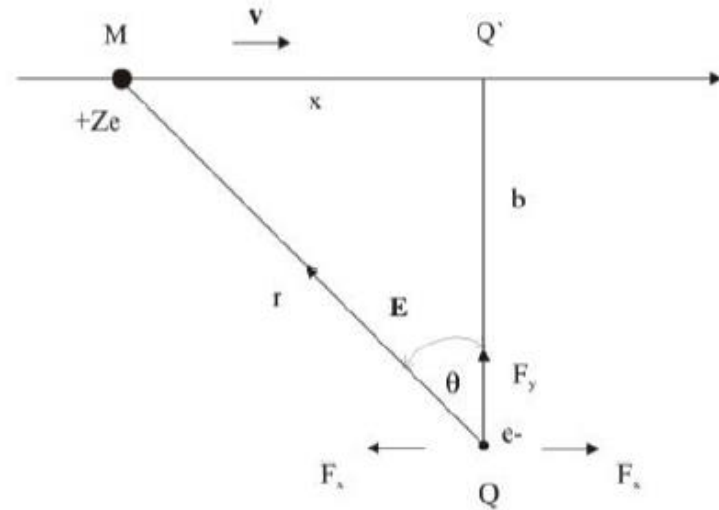
A. Brad's valey

B. Bragg valey

C. Bragg peak

D. Bill's peak

Which type of interaction is dominant between proton/ion beam with electrons from molecules of human body?



2

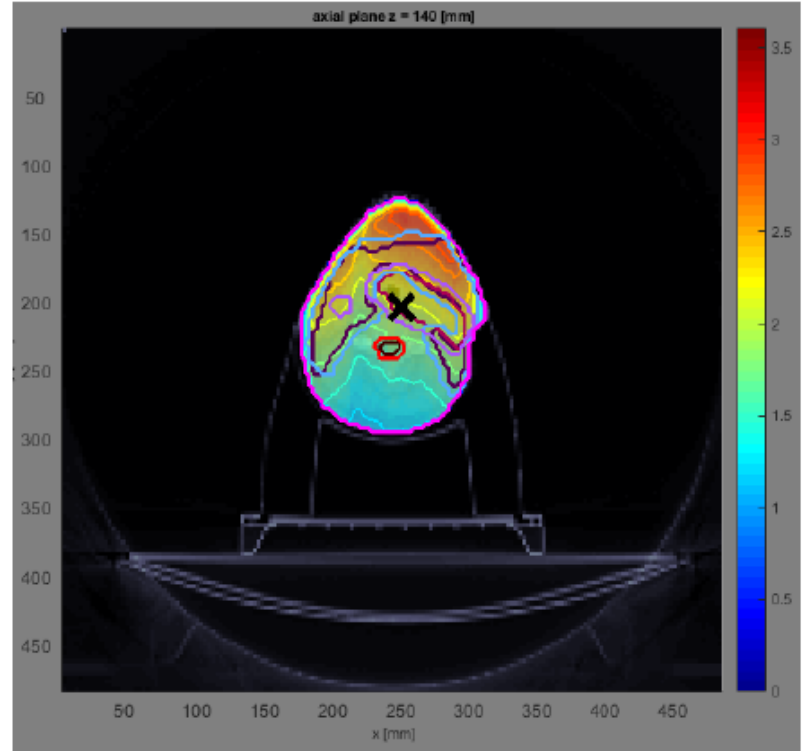
A. Electromagnetic force

B. Weak force

C. Strong force

D. Gravitational force

From the picture below, what particles are used to treat tumor?



3

A. Protons

B. Photons

C. Carbon ions

D. Pions

Most commonly used ions for therapy?



Periodic Table of the Elements

1 1IA 1A	2 2IA 2A											13 3A 3A	14 4A 4A	15 5A 5A	16 6A 6A	17 7A 7A	18 8A 8A																				
1 H Hydrogen 1.008	2 He Helium 4.003											3 B Boron 10.811	4 C Carbon 12.011	5 N Nitrogen 14.007	6 O Oxygen 15.999	7 F Fluorine 18.998	8 Ne Neon 20.180																				
3 Li Lithium 6.941	4 Be Beryllium 9.012	3 Na Sodium 22.990	4 Mg Magnesium 24.305	5 Al Aluminum 26.982	6 Si Silicon 28.086	7 P Phosphorus 30.974	8 S Sulfur 32.06	9 Cl Chlorine 35.45	10 Ar Argon 39.948											11 K Potassium 39.098	12 Ca Calcium 40.078	13 Sc Scandium 44.956	14 Ti Titanium 47.88	15 V Vanadium 50.942	16 Cr Chromium 51.996	17 Mn Manganese 54.938	18 Fe Iron 55.845	19 Co Cobalt 58.933	20 Ni Nickel 58.693	21 Cu Copper 63.546	22 Zn Zinc 65.38	23 Ga Gallium 69.723	24 Ge Germanium 72.63	25 As Arsenic 74.922	26 Se Selenium 78.96	27 Br Bromine 79.904	28 Kr Krypton 83.8
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.63	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.8																				
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98.906	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.367	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29																				
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanide Series	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.222	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.387	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222																				
87 Fr Francium 223	88 Ra Radium 226	89-103 Actinide Series	104 Rf Rutherfordium 261	105 Db Dubnium 262	106 Sg Seaborgium 263	107 Bh Bohrium 264	108 Hs Hassium 265	109 Mt Meitnerium 266	110 Ds Darmstadtium 267	111 Rg Roentgenium 268	112 Cn Copernicium 269	113 Uut Ununtrium 270	114 Fl Flerovium 270	115 Uup Ununpentium 271	116 Lv Livermorium 273	117 Uus Ununseptium 274	118 Uuo Ununoctium 276																				
Lanthanide Series		57 La Lanthanum 138.905	58 Ce Cerium 140.12	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.930	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.967																					
Actinide Series		89 Ac Actinium 227	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.083	99 Es Einsteinium 252.083	100 Fm Fermium 257.103	101 Md Mendelevium 258.103	102 No Nobelium 259.103	103 Lr Lawrencium 260.103																					
Alkali Metals	Alkaline Earths	Transition Metals	Group Metals	Coin Metals	Hydrogen	Halogens	Noble Gases	Lanthanides	Actinides																												

4

A. Uranium ions

B. Argon ions

C. Oxygen ions

D. Carbon ions

What is the unit for absorbed dose?



5

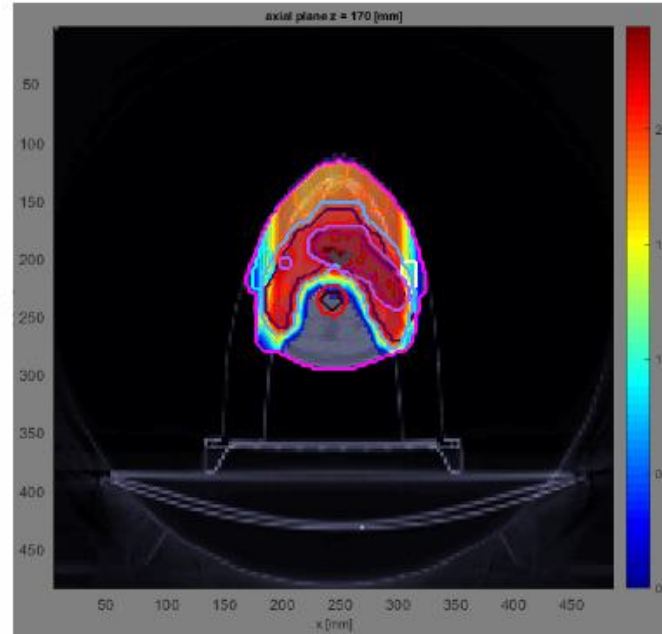
A. 1 Joule

B. 1 Newton

C. 1 Green

D. 1 Gray

Dose on the critical organs using proton/ion therapy instead of X-ray therapy is:



6

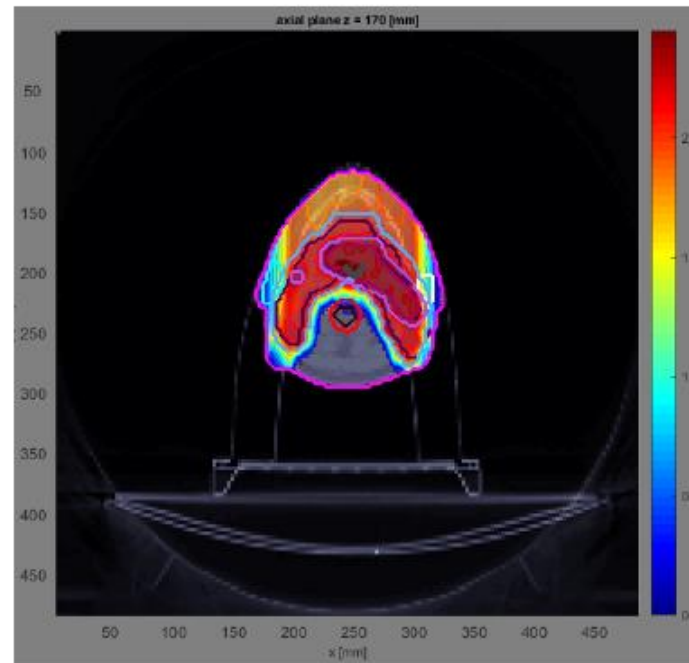
A. bigger

B. smaller

C. I don't know

D. equal

Dose on the skin using proton/ion therapy instead of X-ray therapy is:



7

A. smaller

B. bigger

C. equal

D. I don't know

Which energy level
did you reach?