

**2018 CERN Summer Student Lecture Programme:**

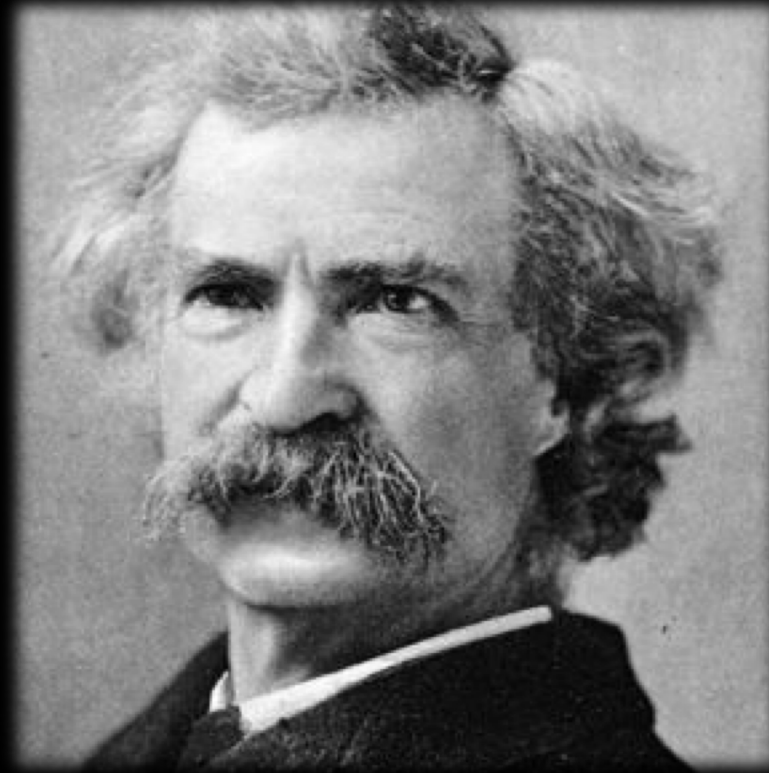
# **Closing Address**

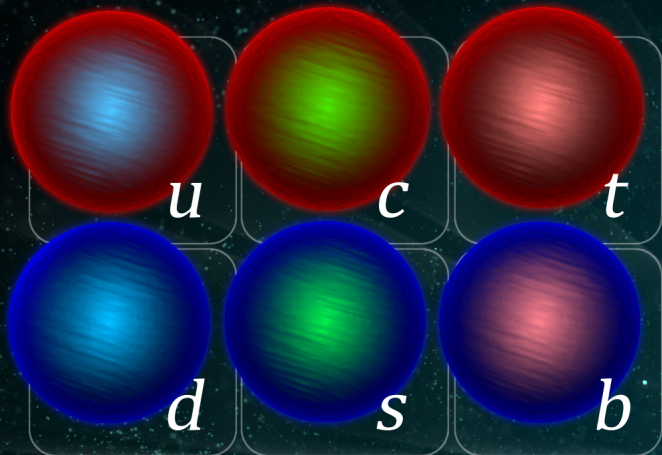
**Gian Francesco Giudice**





All you need in this life is ignorance and confidence, and then success is sure!

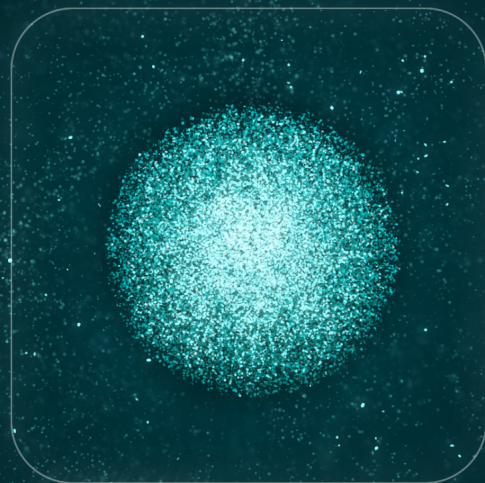




Quarks



Leptons



Higgs boson



Forces

# Periodic Table of the Elements

|                                        |                                        |                                       |                                            |                                        |                                         |                                         |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                          |                                          |                                           |                                          |
|----------------------------------------|----------------------------------------|---------------------------------------|--------------------------------------------|----------------------------------------|-----------------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|
| 1<br><b>H</b><br>Hydrogen<br>1.008     |                                        |                                       |                                            |                                        |                                         |                                         |                                        |                                         |                                           |                                          |                                          |                                         |                                        |                                          |                                          |                                           | 2<br><b>He</b><br>Helium<br>4.003        |
| 3<br><b>Li</b><br>Lithium<br>6.941     | 4<br><b>Be</b><br>Beryllium<br>9.012   |                                       |                                            |                                        |                                         |                                         |                                        |                                         |                                           |                                          |                                          | 5<br><b>B</b><br>Boron<br>10.811        | 6<br><b>C</b><br>Carbon<br>12.011      | 7<br><b>N</b><br>Nitrogen<br>14.007      | 8<br><b>O</b><br>Oxygen<br>15.999        | 9<br><b>F</b><br>Fluorine<br>18.998       | 10<br><b>Ne</b><br>Neon<br>20.180        |
| 11<br><b>Na</b><br>Sodium<br>22.990    | 12<br><b>Mg</b><br>Magnesium<br>24.305 |                                       |                                            |                                        |                                         |                                         |                                        |                                         |                                           |                                          |                                          | 13<br><b>Al</b><br>Aluminum<br>26.982   | 14<br><b>Si</b><br>Silicon<br>28.086   | 15<br><b>P</b><br>Phosphorus<br>30.974   | 16<br><b>S</b><br>Sulfur<br>32.066       | 17<br><b>Cl</b><br>Chlorine<br>35.453     | 18<br><b>Ar</b><br>Argon<br>39.948       |
| 19<br><b>K</b><br>Potassium<br>39.098  | 20<br><b>Ca</b><br>Calcium<br>40.078   | 21<br><b>Sc</b><br>Scandium<br>44.956 | 22<br><b>Ti</b><br>Titanium<br>47.867      | 23<br><b>V</b><br>Vanadium<br>50.942   | 24<br><b>Cr</b><br>Chromium<br>51.996   | 25<br><b>Mn</b><br>Manganese<br>54.938  | 26<br><b>Fe</b><br>Iron<br>55.845      | 27<br><b>Co</b><br>Cobalt<br>58.933     | 28<br><b>Ni</b><br>Nickel<br>58.693       | 29<br><b>Cu</b><br>Copper<br>63.546      | 30<br><b>Zn</b><br>Zinc<br>65.38         | 31<br><b>Ga</b><br>Gallium<br>69.723    | 32<br><b>Ge</b><br>Germanium<br>72.631 | 33<br><b>As</b><br>Arsenic<br>74.922     | 34<br><b>Se</b><br>Selenium<br>78.972    | 35<br><b>Br</b><br>Bromine<br>79.904      | 36<br><b>Kr</b><br>Krypton<br>84.798     |
| 37<br><b>Rb</b><br>Rubidium<br>85.468  | 38<br><b>Sr</b><br>Strontium<br>87.62  | 39<br><b>Y</b><br>Yttrium<br>88.906   | 40<br><b>Zr</b><br>Zirconium<br>91.224     | 41<br><b>Nb</b><br>Niobium<br>92.906   | 42<br><b>Mo</b><br>Molybdenum<br>95.95  | 43<br><b>Tc</b><br>Technetium<br>98.907 | 44<br><b>Ru</b><br>Ruthenium<br>101.07 | 45<br><b>Rh</b><br>Rhodium<br>102.906   | 46<br><b>Pd</b><br>Palladium<br>106.42    | 47<br><b>Ag</b><br>Silver<br>107.868     | 48<br><b>Cd</b><br>Cadmium<br>112.411    | 49<br><b>In</b><br>Indium<br>114.818    | 50<br><b>Sn</b><br>Tin<br>118.711      | 51<br><b>Sb</b><br>Antimony<br>121.760   | 52<br><b>Te</b><br>Tellurium<br>127.6    | 53<br><b>I</b><br>Iodine<br>126.904       | 54<br><b>Xe</b><br>Xenon<br>131.294      |
| 55<br><b>Cs</b><br>Cesium<br>132.905   | 56<br><b>Ba</b><br>Barium<br>137.328   | 57-71                                 | 72<br><b>Hf</b><br>Hafnium<br>178.49       | 73<br><b>Ta</b><br>Tantalum<br>180.948 | 74<br><b>W</b><br>Tungsten<br>183.84    | 75<br><b>Re</b><br>Rhenium<br>186.207   | 76<br><b>Os</b><br>Osmium<br>190.23    | 77<br><b>Ir</b><br>Iridium<br>192.217   | 78<br><b>Pt</b><br>Platinum<br>195.085    | 79<br><b>Au</b><br>Gold<br>196.967       | 80<br><b>Hg</b><br>Mercury<br>200.592    | 81<br><b>Tl</b><br>Thallium<br>204.383  | 82<br><b>Pb</b><br>Lead<br>207.2       | 83<br><b>Bi</b><br>Bismuth<br>208.980    | 84<br><b>Po</b><br>Polonium<br>[208.982] | 85<br><b>At</b><br>Astatine<br>209.987    | 86<br><b>Rn</b><br>Radon<br>222.018      |
| 87<br><b>Fr</b><br>Francium<br>223.020 | 88<br><b>Ra</b><br>Radium<br>226.025   | 89-103                                | 104<br><b>Rf</b><br>Rutherfordium<br>[261] | 105<br><b>Db</b><br>Dubnium<br>[262]   | 106<br><b>Sg</b><br>Seaborgium<br>[266] | 107<br><b>Bh</b><br>Bohrium<br>[264]    | 108<br><b>Hs</b><br>Hassium<br>[269]   | 109<br><b>Mt</b><br>Meitnerium<br>[268] | 110<br><b>Ds</b><br>Darmstadtium<br>[269] | 111<br><b>Rg</b><br>Roentgenium<br>[272] | 112<br><b>Cn</b><br>Copernicium<br>[277] | 113<br><b>Nh</b><br>Nihonium<br>unknown | 114<br><b>Fl</b><br>Flerovium<br>[289] | 115<br><b>Mc</b><br>Moscovium<br>unknown | 116<br><b>Lv</b><br>Livermorium<br>[298] | 117<br><b>Ts</b><br>Tennessine<br>unknown | 118<br><b>Og</b><br>Oganesson<br>unknown |

|                                         |                                       |                                            |                                         |                                          |                                         |                                         |                                         |                                         |                                           |                                         |                                        |                                          |                                         |                                         |
|-----------------------------------------|---------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
| 57<br><b>La</b><br>Lanthanum<br>138.905 | 58<br><b>Ce</b><br>Cerium<br>140.116  | 59<br><b>Pr</b><br>Praseodymium<br>140.908 | 60<br><b>Nd</b><br>Neodymium<br>144.242 | 61<br><b>Pm</b><br>Promethium<br>144.913 | 62<br><b>Sm</b><br>Samarium<br>150.36   | 63<br><b>Eu</b><br>Europium<br>151.964  | 64<br><b>Gd</b><br>Gadolinium<br>157.25 | 65<br><b>Tb</b><br>Terbium<br>158.925   | 66<br><b>Dy</b><br>Dysprosium<br>162.500  | 67<br><b>Ho</b><br>Holmium<br>164.930   | 68<br><b>Er</b><br>Erbium<br>167.259   | 69<br><b>Tm</b><br>Thulium<br>168.934    | 70<br><b>Yb</b><br>Ytterbium<br>173.055 | 71<br><b>Lu</b><br>Lutetium<br>174.967  |
| 89<br><b>Ac</b><br>Actinium<br>227.028  | 90<br><b>Th</b><br>Thorium<br>232.038 | 91<br><b>Pa</b><br>Protactinium<br>231.036 | 92<br><b>U</b><br>Uranium<br>238.029    | 93<br><b>Np</b><br>Neptunium<br>237.048  | 94<br><b>Pu</b><br>Plutonium<br>244.064 | 95<br><b>Am</b><br>Americium<br>243.061 | 96<br><b>Cm</b><br>Curium<br>247.070    | 97<br><b>Bk</b><br>Berkelium<br>247.070 | 98<br><b>Cf</b><br>Californium<br>251.080 | 99<br><b>Es</b><br>Einsteinium<br>[254] | 100<br><b>Fm</b><br>Fermium<br>257.095 | 101<br><b>Md</b><br>Mendelevium<br>258.1 | 102<br><b>No</b><br>Nobelium<br>259.101 | 103<br><b>Lr</b><br>Lawrencium<br>[262] |

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Basic Metal
- Semimetal
- Nonmetal
- Halogen
- Noble Gas
- Lanthanide
- Actinide





CMS Experiment at the LHC, CERN

Data recorded: 2012-May-27 23:35:47.271030 GMT

Run/Event: 195099 / 137440354

