

High Energy Physics

Marko Djurić

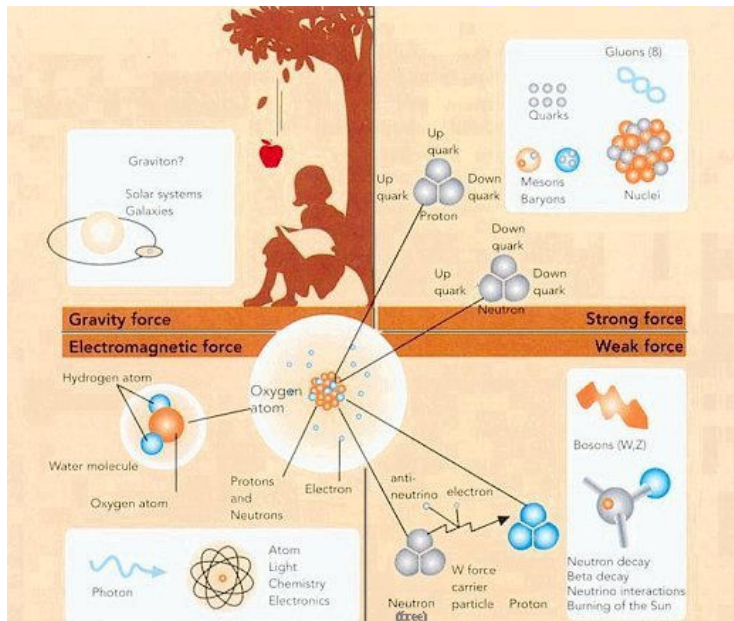
Centro de Física do Porto

Faculdade de Ciências da Universidade do Porto

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- ▶ Hence there is a need to replace the theory at energy scales of order $M_P = 10^{19}m_p$.
- ▶ Similarly, Fermi's theory of weak interactions was non-renormalizable, and was replaced by electroweak theory at high energy scales.

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- ▶ Like gravity, gluons also couple to each other, making the theory very difficult to study, but the theory is renormalizable.
- ▶ We will be especially interested at studying this theory when the coupling is strong.

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- ▶ It can also accommodate all the other particles and forces of the standard model.

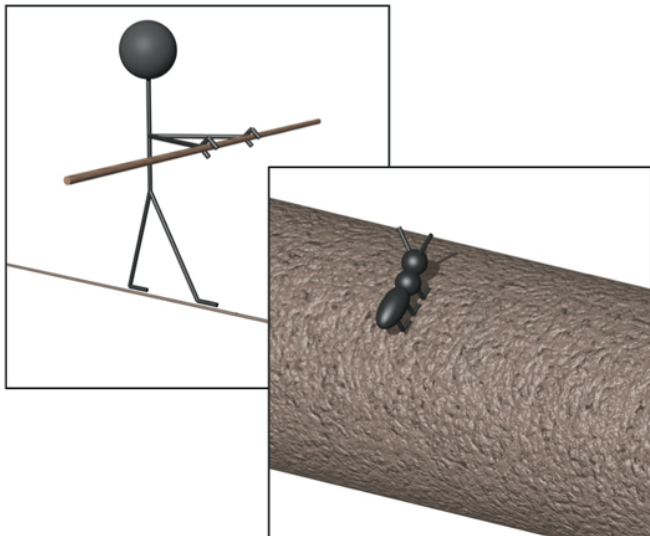
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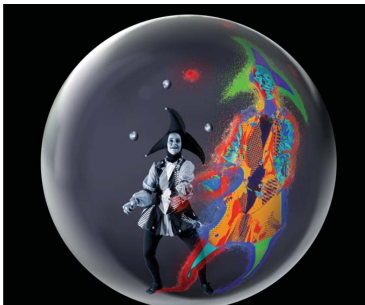
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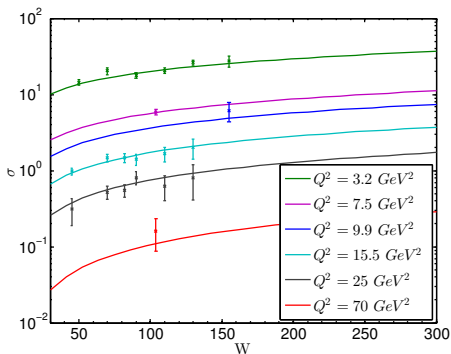


Figure: Costa, MD, 2012, $\chi^2 = 1.00$

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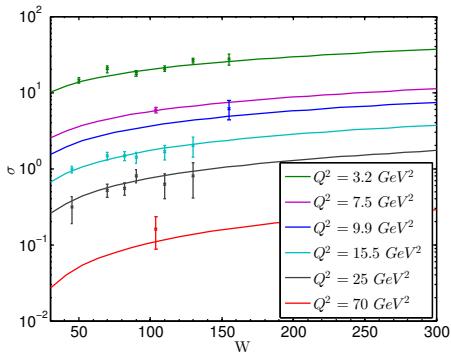


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Great agreement between theory and experiment!

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- ▶ Vairinhos - Monte Carlo simulations
- ▶ Zoakos - applications including the addition of quarks, and to condensed matter systems

Thank you!