The U boson as a generalized dark photon
(possibly behaving as an axionlike particle)

cours donnés par Pierre Fayet*

Could a new interaction exist in nature ? Beyond weak, electromagnetic and strong interactions within the standard model, it is natural to enquire about an additional one, associated with an extra-$U(1)$ gauge group. The corresponding boson, called U forty years ago, may be (very) light, and (very) weakly coupled, its properties depending on m_U, the size of its coupling, and associated current (which further depends on the Brout-Englert-Higgs sector). Its vector part is a combination of electromagnetic with B and L (or $B-L$) currents. Axial couplings may also be present, which may make the spin-1 U boson interact much like a spin-0 axion-like particle.

We discuss, in connection with the underlying theory, some of the effects of such a new boson, including its production in e^+e^- annihilations and beam dump experiments, ψ, Y and K decays, parity-violation effects in atomic physics, anomalous magnetic moments of charged leptons, non-standard neutrino interactions, a possible "protophobic" behaviour suppressing $\pi^0 \to \gamma U$ decays (related with a tentative interpretation of the Atomki anomaly in some nuclear reactions). The U may also serve as a mediator to a new dark sector, allowing for thermally-produced light dark matter particles.

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Place : *Auditorium Joliot-Curie*
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