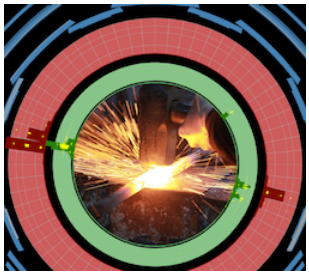

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Z'_{BL} portal dark matter and LHC Run-2 results

Tuesday 10 May 2016 18:00 (15 minutes)

We consider a concise dark matter scenario in the minimal gauged $B-L$ extension of the Standard Model (SM), where the global $B-L$ (baryon number minus lepton number) symmetry in the SM is gauged, and three generations of right-handed neutrinos and a $B-L$ Higgs field are introduced.
Associated with the $B-L$ gauge symmetry breaking by a VEV of the $B-L$ Higgs field, the seesaw mechanism for generating the neutrino mass is automatically implemented after the electroweak symmetry breaking in the SM.
In this model context, we introduce a Z_2-parity and assign an odd parity for one right-handed neutrino while even parities for the other fields.
Therefore, the dark matter candidate is identified as the right-handed Majorana neutrino with odd Z_2 parity, keeping the minimality of the particle content intact.
When the dark matter particle communicates with the SM particles mainly through the $B-L$ gauge boson (Z'_{BL} boson), its relic abundance is determined by only three free parameters, the $B-L$ gauge coupling (α_{BL}), the Z'_{BL} boson mass ($m_{Z'}$) and the dark matter mass (m_{DM}).
With the cosmological upper bound on the dark matter relic abundance we find a lower bound on α_{BL} as a function of $m_{Z'}$.
On the other hand, we interpret the recent LHC Run-2 results on search for Z' boson resonance to an upper bound on α_{BL} as a function of $m_{Z'}$.
Combining the two results we identify an allowed parameter region for this "Z'_{BL} portal" dark matter scenario, which turns out to be a narrow window with the lower mass bound of $m_{Z'} > 2.5$ TeV.

Summary

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