
Z' and W' mini-reviews

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Mini-review on “ W' boson searches”

Pages 1-2: General discussion of W' couplings to quarks and leptons, and an overview of specific models.

Pages 3-6: Collider searches

Pages 6-7: Low-energy constraints

Pages 7-8: References

Mini-review on “ Z' boson searches”

1st line: “The Z' boson is a hypothetical massive, electrically-neutral and color-singlet particle of spin 1.”

Pages 1-2: General discussion of Z' couplings

Pages 3-5: $U(1)'$ models

Pages 5-6: Other models

Page 7: LEP II limits on Z'

Pages 7-10: Searches at hadron colliders

Pages 10-11: Low energy constraints

Pages 11-13: References

PDG Advisory Committee: "The review should include Ref. to the possibility that the Z'/W' are excitations of extra dimension (flat or warped) or composite Higgs, it seems way to specific model oriented in general."

I would like to draw the attention to the following paragraphs on page 5:

"If the electroweak gauge bosons propagate in extra dimensions, then their Kaluza-Klein (KK) excitations include a series of Z' boson pairs. Each of these pairs can be associated with a different $SU(2) \times U(1)$ gauge group in four dimensions. The properties of the KK particles depend strongly on the extra-dimensional theory [11]. For example, in universal extra dimensions there is a parity that forces all couplings of Eq. (1) to vanish in the case of the lightest KK bosons, while allowing couplings to pairs of fermions involving a SM one and a heavy vector-like fermion. There are also 4-dimensional gauge theories (e.g., little Higgs with T parity) with Z' bosons exhibiting similar properties. By contrast, in a warped extra dimension, the couplings of Eq. (1) may be sizable even when SM fields propagate along the extra dimension.

[11] J. Parsons and A. Pomarol, "Extra dimensions" in this *Review*.

and on page 6: " Z' bosons may also be composite particles. For example, in technicolor theories [12], the techni- ρ is a spin-1 boson that may be interpreted as arising from a spontaneously broken gauge symmetry [13]."

[12] R.S. Chivukula, M. Narain, J. Womersley, "Dynamical electroweak symmetry breaking" in this *Review*.

PDG Advisory Committee:

Z' coupling and alignment: while the statement about severe constraints from FCNC on non-universal coupling is correct it ignores the possibility of protection due to $U(2)$ approx' universality and furthermore even the first two gen' need not be universal if alignment mechanism is at work (for review: :1005.3106 and for a recent analysis of alignment models, showing that bounds can be relaxed: 1202.5038).

My reply: the paragraph on generation-dependent couplings (page 5 of the Z' review) is already long, and it includes some references. But, of course, additional references can be included...

Plans:

- Update the LHC searches
- Emphasize only the Tevatron searches that are still competitive with the LHC in some mass range.
- Shorten the discussion of $U(1)'$ models in the Z' review.
- ...