Andrei Sakharov Prize Talk: Parity in Our World and in Physics

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It is an honor to be recognized along with human rights activist Narges Mohammadi, and to be associated in this manner with Andrei Sakharov whose work in Physics and peace is an inspiration. My work has focused on the idea of restoring parity, both in physics and in the world.

In the real world we find that parity in opportunity or equality between the privileged and the under-privileged is badly broken. I will talk about efforts of human rights movements in India towards equitable, sustainable development, which have been on major fronts such as ensuring the voice of the underprivileged is represented in decision making on big projects that might have an impact on them, ensuring that public/government services such as those that end malnutrition, provide access to education and health care for all are implemented properly, and a safe environment with equal opportunity, that includes the opportunity to overcome historic injustices, is there for different castes, genders and religions.

In physics parity (P) can be restored very elegantly in the Minimal Left-Right Symmetric model. P is spontaneously broken so that ν_R gets a very high mass that could even be as high as $\leq 10^{15} GeV$. I find that if CP violation is also present in the leptonic Yukawa sector, this can induce too large a strong CP Phase (since both P and CP will now be violated in leptonic sector) in one loop. So leptonic CP violation (δ_{CP}) must be absent in significant regions of this model. I will spend 10 minutes of my talk discussing this result that can test if parity is restored in nature, even if the scale of restoration is very, very high.

It is interesting that one of Sakahrovs conditions for baryogenesis is CP violation, and leptonic CP violation could help with this. But in ultra-violet completions of the Minimal Left-Right Symmetric model that solve the strong CP problem without axions, there can be other sources for CP violation.

[1]www.aidindia.org