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Aspects of topos theory in cosmology

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We use the ‘local weakening of logic in a spacetime’ as a mathematical tool suitable also for building cosmological models. The models extend the regular spacetime solutions of Einstein equations towards solutions with certain spacetime singularities. Such models are also natural for addressing the renormalization questions of various quantum field theories. We discuss this issue briefly.

There exist several weak logics; here we deal with the internal logic of a smooth topos \mathcal{B} of sheaves on a site, constructed by Moerdijk and Reyes. The weakening of logic gives rise to the indistinguishability of the standard real line and the reals internal to \mathcal{B} , allowing for the shift between them, being the core of various physical effects. Thus the approach is another example of the use of topos theory in physics, this time in cosmology.

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