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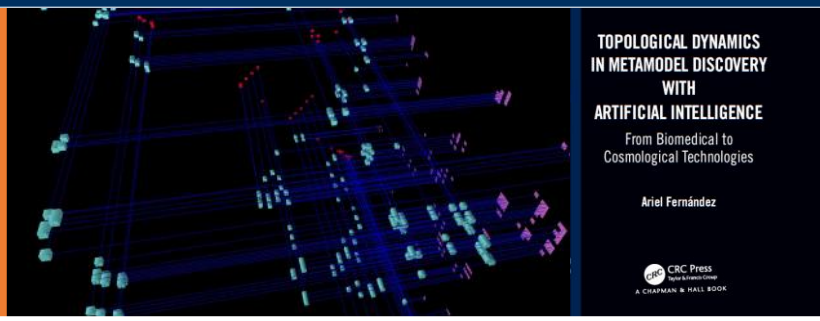

EINLADUNG

ZUM MATHEMATISCHEN KOLLOQUIUM

gemeinsames Kolloquium der Mathematik, Physik und Chemie

Es spricht

Herr Ph. D. Ariel Fernández Stigliano

(Conicet-National Research Council, Buenos Aires 1033, Argentina
Daruma Institute for Applied Intelligence, AF Innovation, High Point, NC 27262, USA)

Zum Thema:

**„Querying Artificial Intelligence on Dark Matter:
Reverse Engineering the Standard Model to Fit an Early Universe"**

Abstract:
A good quote to start a conversation on dark matter (DM) is the phrase "I know that I know nothing" that Plato put in the mouth of his real or fictional teacher Socrates. Stars revolve around the center of galaxies seemingly out of control, and the accelerated expansion of the universe describes a runaway behavior completely at odds with physics predictions. As we prod the cosmos at very large scales, basic tenets of physics crumble under the weight of contradicting evidence. The talk is meant to help mitigate the crisis. It resorts to artificial intelligence for answers and describes the outcome of this quest in terms of an ur-universe that incorporates an extra dimension to encode space-time as a latent manifold.

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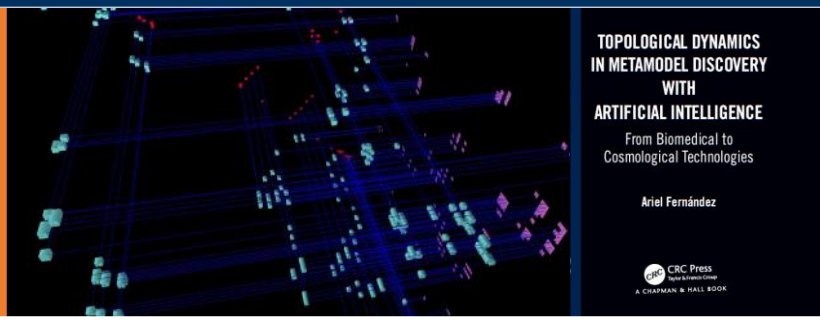

DM is now believed to have arisen during the creation of elementary particles in an early universe. In contrast with our present-day "flat" universe, this early universe was endowed with extreme geometric curvature and, consequently, with special quantization rules. To begin to validate this picture, we have leveraged an AI platform previously designed as autoencoder for dynamical systems. This platform is capable of reverse engineering the action principles that underlie the Standard Model of particle physics. The deconstruction treats Einstein's 4D space-time as a "latent space" that gets decoded onto a higher dimensional space. The latter is endowed with an extra rolled-up dimension that spans the quark scale, which is the smallest material scale estimated at circa 10-18m. It turns out that this compact fifth dimension stores stationary wave-matter with a rest mass that matches the vacuum expectation value of the Higgs boson. This result enabled us to estimate particle masses with significant precision by an AI-based decoding of the particle fields along the fifth dimension. The results point to the existence of an ur-Higgs boson in the early universe, specifically at the beginning of the "electroweak epoch", whose kinetic energy is not geometrically diluted along the standard 4D dimensions. This ur-Higgs and its heavier quantum partners are identified by AI as DM. Far more work will be required to characterize DM vis-à-vis the geometric dilution of gravity shown to have taken place as the universe flattened and expanded to present-day levels.

Dienstag, 22. November 2022, 17:15 Uhr, Faraday-Hörsaal

Alle Interessierten sind herzlich eingeladen!

Ilmenau, 21.09.2022

Das Institut für Mathematik