



PHYSICS COLLOQUIUM.

On the Future of the Planet:
the Universal Laws of Life, Growth, Death and Sustainability from Organisms to Cities

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DESY | Zeuthen | Video colloquia



Why do we stop growing, live for 100 years and sleep 8 hours a day? Why do companies and people die whereas cities keep growing and the pace of life continues to accelerate? How are these related to metabolism, innovation, wealth creation, social networks, and long-term global sustainability? These are among the questions addressed in this lecture. Although life is probably the most complex phenomenon in the Universe, many of its fundamental characteristics scale with size in a surprisingly simple universal fashion: metabolic rate, for example, scales systematically from cells to whales, while time-scales from lifespans to growth-rates, and sizes from genome lengths to tree heights, do likewise. Remarkably, cities, companies and universities exhibit similar systematic scaling: wages, profits, patents, crime, disease, and roads also scale approximately universally. The origin of these laws will be explained and a conceptual theoretical framework based on generic principles of the networks that sustain life from circulatory systems to social networks will be presented. Their dynamics, which transcend history, geography and culture, have dramatic implications for growth, long-term global sustainability and collapse.

