

Department of Theoretical Physics
Lecture Series



**Sphalerons and matter-antimatter asymmetry
of the Universe**

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Lecture 1 (Monday, 24 February 2020, 17:30, Room AG80)

Topology of Yang-Mills theory. Large gauge transformations. Instantons. Sphalerons in the presence of Higgs. Jackiw-Rebbi vacua and axial current anomaly.

Lecture 2 (Tuesday, 25 February 2020, 13:00, Room A304)

Connection of the sphaleron to $B + L$ number anomaly. The temperature dependent effective potential. Sphalerons at $T \approx v_{EW}$ and fermion number violation rate. Anomaly at $T > v_{EW}/\alpha_W$.

Lecture 3 (Wednesday, 26 February 2020, 17:30, Room A304)

Weinberg-Sakharov criteria for dynamical origin of baryon number. The options tree for matter-antimatter asymmetry. “Electroweak baryogenesis” a review and possible variants. Problem of inadequate CP violation. Leptogenesis - high scale in $SO(10)$. Connection to low energy neutrino data. Leptogenesis - low scale within Left-Right symmetric models.