

## **Lectures on non-perturbative quantum theory**

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56 hours: 16 lectures (32 hours), 12x2 hours of practical training

1. Example of asymptotic expansion
2. Asymptotic expansion in  $d=0$  QFT
3. Non-visible in asymptotic expansion terms, trans-series
4. Borel resummation, Borel transform
5. Particle in potential with walls
6. 2d field theory with two vacuums, sin-Gordon model, etc.
7. 't Hooft - Polyakov monopole
8. Homotopy, mappings of spheres into spheres
9. Dirac vs Wu-Yang monopole
10. BPST instantons
11. Gauge theory vacuums, theta-angle
12. Instantons in quantum mechanics
13. Non-perturbative corrections in quantum theory
14. On an Index theorems I
15. On an index theorems II
16. Idea of localization