Experimental Nuclear Physics

1. **Nuclear reactions at low energy**
   (a) High Spin; Gamma spectroscopy, Yrast lines, superdeformed nuclei.
   (b) Molecular resonances
   (c) Heavy ion fusion at low enegy
   (d) Compound nucleus decay
2. **Exotic and Superheavy nuclei**
   (a) Exotic nuclei: Halo nuclei, Drip lines, proton and neutron rich nuclei, new magic numbers
   (b) Experimental methods for exotic nuclei production: ISOL and IN-FLIGHT
   (c) Experiments for production of nuclei near the drip lines. Ion Traps. Main facilities: ISOLDE, SPIRAL, FRS
   (d) Production of transuranic nuclei. The stability island. Main experiments for superheavy nuclei produvtion. The new elements.
3. **Nuclear reactions at intermediate and relativistic energies**
   (a) The Nuclear Equation of State
   (b) Giant Resonances
   (c) Hot nuclei
   (d) Particle production in nuclear matter
   (e) Chiral phase transition in nuclear matter
4. **Nuclear reactions at ultrarelativistic energies**
   (a) The quark gluon plasma
   (b) Probes for the formation of the gluon-quark plasma
   (c) SPS, RHICH ans LHC Experiments
5. **Nuclear Physics in Astrophysics**
   (a) Primitive nucleosynthesis

(b) Estelar nucleosynthesis

6. **Nuclear Physics in Medicine**

   (a) Radiotherapy and hadron therapy
   (b) Radioisotope synthesis
   (c) PET image

7. **Applications of Nuclear Physics to elemental analysis and material Science**

   (a) Rutherford Back Scattering: Surface elemental analysis
   (b) Proton and Heavy Ions Induced X ray emission.
   (c) Neutron capture
   (d) Positron annhilation
   (e) Synchrotron radiation

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