Nuclear Science Week
at Dallas Makerspace

Introduction to Atomic Energy

Lecture Series

Monday, 18 October • Tuesday • Thursday • Friday, 22 October

8—9 PM

Part 1 : From Democritus to Hahn and Meitner How did we come to understand the structure of matter? *The origins of the atomic theory of matter in classical Greece • the gas laws of Boyle, Charles, and Gay–Lussac • Dalton's law of constant proportions and the periodic law of Mendeleef • cathode rays, Millikan, and the electron • Becquerel discovers radioactivity • Rutherford infers the existence of the nucleus • Chadwick, the neutron, and artifical radioactivity • particle accelerators • trans–uranium elements, Hahn, Meitner, and fission.*

Part 2 : Radioactivity and Nuclear Reactions What transformations do nuclei undergo, why, and what are the results? *Rutherford's "alpha", "beta", and "gamma rays" • radioactive series • the strong force: alpha and cluster decay • the weak force: beta, positive–beta, and electron–capture decay • isomeric transitions • neutron–nucleus interactions: capture, (n,2n), disintegration • multi–nucleus interactions: (p,n), disintegration, spallation, fusion and the energy of the stars • fission, spontaneous and induced, and the chain reaction.*

Part 3 : Atoms at Work in Science, Industry, and Medicine What are the practical applications of unstable atoms in modern society? *Techniques and instruments for detecting radiation — ionization–chamber smoke detectors • heat and power sources • radioilluminants • miscellaneous uses of ionization • radiation gages • isotope tracer techniques • radiation therapy • research reactors : isotope production, neutron activation analysis, neutron diffraction.*

Part 4 : Fission Power Reactors How is fission heat serving to supply our daily needs? *Special–purpose power reactors: submarines, rockets, airplanes • world energy needs and resources: fission fuel cycles and "breeding" • central–station power reactors • light–water reactors: pressurized, boiling, spectral–shift, and the light–water thorium breeder • heavy–water reactors (CANDU) • gas cooled–reactors: MAGNOX, AGR, HTR • graphite–water reactors (the RBMK) • liquid–metal fast reactors • organic–cooled, sodium–graphite, molten–salt, and other concepts.*

Saturday, 23 October, 1—8 PM (North Lobby)

Nuclear Science Day

In conjunction with National Nuclear Science Week, we will have an afternoon of exhibits, discussions, demonstrations, and videos (some newly transferred from film) relating to the place of atomic energy and nuclear phenomena in our lives.

For more information, contact C.D. Carson, *publius@man–and–atom.info*