Chapter 8

Age Measurements
Natural decay series: $^{238}\text{U}$

- Uranium-238 ($^{238}\text{U}$) → Protactinium-234m ($^{234}\text{Pa}$) → Thorium-234 ($^{234}\text{Th}$) → Thorium-230 ($^{230}\text{Th}$) → Radium-226 ($^{226}\text{Ra}$) → Radon-222 ($^{222}\text{Rn}$) → Polonium-218 ($^{218}\text{Po}$) → Polonium-214 ($^{214}\text{Po}$) → Polonium-210 ($^{210}\text{Po}$) → Lead-210 ($^{210}\text{Pb}$) → Lead-210 (stable)
Natural decay series: $^{235}\text{U}$
A Clock in the Rock

materials with the same age will fall along a single line:

\[ T_{\text{sol.sys.}} = 4.565 \text{ Byrs} \]
Globular Cluster M13
Globular Cluster M13

Grove Creek Observatory
Australia

Lowell Observatory
1.1 m telescope
Hertzsprung-Russel Diagram: global view
Hertzspung-Russel Diagram
HRD of Globular Cluster 47 Tuc

distance ~100 pc ; diameter in the sky ~ full moon ; seen near SMC ; m = 4.03

\[ T \approx 12 \text{ Byrs} \]
White Dwarfs in M4

$T_{\text{Gal. Disc}} \sim (9.5\pm2) \text{ Byrs}$