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## Elements Of Modern X Ray Physics

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references and index. ISBN 978-0-470-97395-0 (hardback) □ ISBN 978-0-470-97394-3 (paper) 1. X-rays. I. Als-Nielsen, J. (Jens), 1937□ II. Title. QC481.A47 2011 539.7□222□dc22 2010051101

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It is this variation, and thus the contrast, between different elements that make X-rays so useful for imaging. Tissue is mainly water and hydrocarbons and thus has a 1/e thickness of many centimetres for hard X-rays, whereas bones in the body have a lot of Ca and a correspondingly smaller X-ray transmission.

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The phase difference, between the scattered wave from a volume element around the origin and one around  $r$  is  $\square k \cdot r$ . The resulting phase difference is thus  $\square \square (r) = (k \cdot k \cdot r) \cdot r = Q \cdot r$  where  $Q = k \cdot k \cdot r$  (1.10)  $Q = k \cdot k \cdot r$  is known as the wavevector transfer or scattering

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$0 = 2.82 \times 10^{-5} \text{ \AA}$  Structure: (E field photon and e) Sensitivity to  $r_0 (\hbar/mc^2)$  Magnetism: (E, H field photon and e and  $\mu_B$ ) Neutron  $0 = 1.675 \times 10^{-27} \text{ Kg}$   $\frac{1}{2} = 1.913 \mu_N$   $b \sim r_0$  (Short range nuclear forces)  $b_{\text{mag}} \sim r_0 (\mu_N \cdot B_{\text{dipp}})$  Resonant Scattering:  $100 r_0$   $r_0 = 1.4 \times 10^{-12} \text{ m}$

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Elements of Modern X-ray Physics, Jens Als-Nielsen and Des McMorrow Wiley, New York, 2001. \$99.95, \$29.95 paper (318 pp.). ISBN 0-471-49857-2, ISBN 0-471-49858-0 paper Buy at Amazon. Over its 25-year life span, synchrotron radiation has left an indelible mark on physics. This "leftover" radiation, once the bane of particle accelerator designers, has been found to be far more versatile than that produced by conventional sources.

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