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The Probability Distribution Function in Small-angle Scattering. R.P. Hjelm, Los Alamos Neutron Science Center, Los Alamos National Laboratory, Los Alamos, New Mexico 87545 USA.

A typical small-angle scattering (SAS) measurement on particles in solution on length scales from 1 to 100 nm. Ideally, the particles will not be correlated in position and orientation, in which case the SAS measurement gives information on the spherically-averaged particle structure. Because of the disorder that it inherent in these types of systems, the probability distribution function, p(r), is a natural way of representing the information that is available from the SAS measurement, including particle size, shape and internal structure. The probability distribution function is related to the measured intensity by the sine-transform, $p(r)/r = \frac{2}{\pi}\int QI(Q)\sin QrdQ$, and is thus related to the Debye-Bueche correlation function, γ(r), as $p(r) = 4\pi r^2\gamma(r)$. Features of p(r) have lead to the development of algorithms, notably those of Glatter and of Moore), for the calculation of p(r), which account for instrument resolution functions, and which allow for detailed comparison with model calculations. We will discuss some examples of results from systems where such comparisons have lead to detailed information on the particle structure.