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ASAXS quantifies counterion distributions around DNA and RNA

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Because both RNA and DNA carry large negative charge, interaction with oppositely charged partners is required for folding to functional structures. For example, counterions fold RNA and condense DNA. Despite these important roles, ion detection remains elusive. I describe the application of anomalous SAXS methods that highlight the contribution to the scattering signal arising from counterions [1]. In addition to measuring ion distribution, we also count the number of excess ions surrounding a nucleic acid structure [2,3]. Taken together, measurements of ion number and spatial distribution provide an understanding of the relationship between counterions and nucleic acid structure. Present ASAXS work in the Pollack lab is supported by the NIH through grants R01 GM085062 and R01 GM099450.

[1] S. A. Pabit, K.D. Finkelstein and L. Pollack, "Using Anomalous small angle x-ray scattering to probe the ion atmosphere around nucleic acids", *Meth. Enzym. Biophysical, Chemical, And Functional Probes Of RNA Structure, Interactions And Folding, Pt B*, **[2]** S.A. Pabit, S. P. Meisburger, L.Li, J.M. Blose, C.D. Jones, L. Pollack "Counting ions around DNA with ASAXS", *J. Am. Chem. Soc.*, 132 (46), pp 16334–16336 (2010), **[3]** S. Kirmizialtin*, S.A. Pabit*, S.P. Meisburger, L. Pollack and R. Elber, "RNA and its ionic cloud: Solution scattering experiments and atomically detailed simulations", *Biophysical Journal*, 102, 819-828 (2012).

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