RAPID AND ACCURATE CALCULATION OF A SPEED DEPENDENT SPECTRAL LINE SHAPE

D. REED BEVERSTOCK, Department of Physics, College of William and Mary, Williamsburg, VA, USA;
KENDRA LETCHWORTH WEAVER, Physics, Cornell University, Ithaca, NY, USA; D. CHRIS BENNER,
Department of Physics, College of William and Mary, Williamsburg, VA, USA.

Use of the Voigt profile with the Lorentz width allowed to vary with the speed of collision has been hampered by
the lack of fast accurate algorithms. Such an algorithm has been written assuming a quadratic dependence of the Lorentz
width upon the speed of collision that is accurate to one part in 10,000 and is generally only a factor of four or so slower
than the equivalent Voigt calculation with the Letchworth and Benner algorithm.\(^a\) The only exception to the accuracy is far
from line center near the Doppler limit when the speed dependent parameter is quite large. At this point the spectral line
has fallen by at least 17 orders of magnitude from the line center and is generally insignificant. Gauss-Hermite quadrature
of third to seventeenth order, Taylor series expansion about precomputed points and spline interpolation are used in the
computation of both the real and imaginary parts for various regions.\(^b\)

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