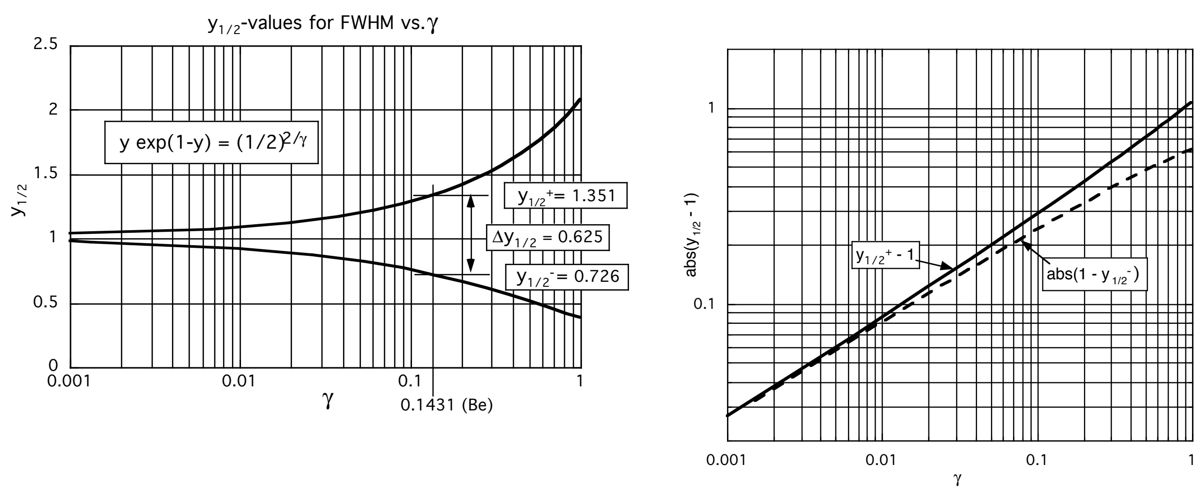
[Greuling-Goertzel FWHM]
(Chapter 1.10.4 in *Elements*)
The full width at half maximum, FWHM, of the slowing-down time distribution is given by the difference $\Delta y_{\frac{1}{2}}$ between the two solutions $y^+_{1/2}$ and $y^-_{1/2}$ of the equation

$$y \exp\left(1 - y\right) = \left(1/2\right)^{\gamma/2} \quad ; \qquad (1)$$

that is,

$$FWHM = \Delta y_{1/2} = y_{1/2}{}^{+} - y_{1/2}{}^{-}. \qquad (2)$$

Solving this awkward equation for *y* given γ involves *Lambert's W function*, $z = W(z)\exp\left(W(z)\right)$ (Corless et al. 1996), little known in practice until recently, and its inverse, which are accessible in modern automated mathematics libraries such as *Mathematica*. The following figure suggests a graphical solution (it is easy to solve the equation for γ for given *y*), illustrating the result $\Delta y_{\frac{1}{2}}$ for beryllium (consult the table in [Slowing-down Parameters]), which is universally used as a reflector in pulsed-neutron sources.



The values of $y_{1/2}$ *at the half-maximum points of the emission time distribution as functions of γ. Left,* $y_{1/2}{}^{+}$ *and* $y_{1/2}{}^{-}$ *vs. γ. Right,* $y_{1/2}{}^{+} - 1$ *and* $1 - y_{1/2}{}^{-}$ *vs. γ, shown to enable accurate reading.*

The right panel enables accurate reading of $\Delta y_{\frac{1}{2}}$ as

$$FWHM = \Delta y_{1/2} = \left|\, y_{1/2}{}^{+} - 1 \,\right| + \left|\, 1 - y_{1/2}{}^{-} \,\right| . \qquad (3)$$