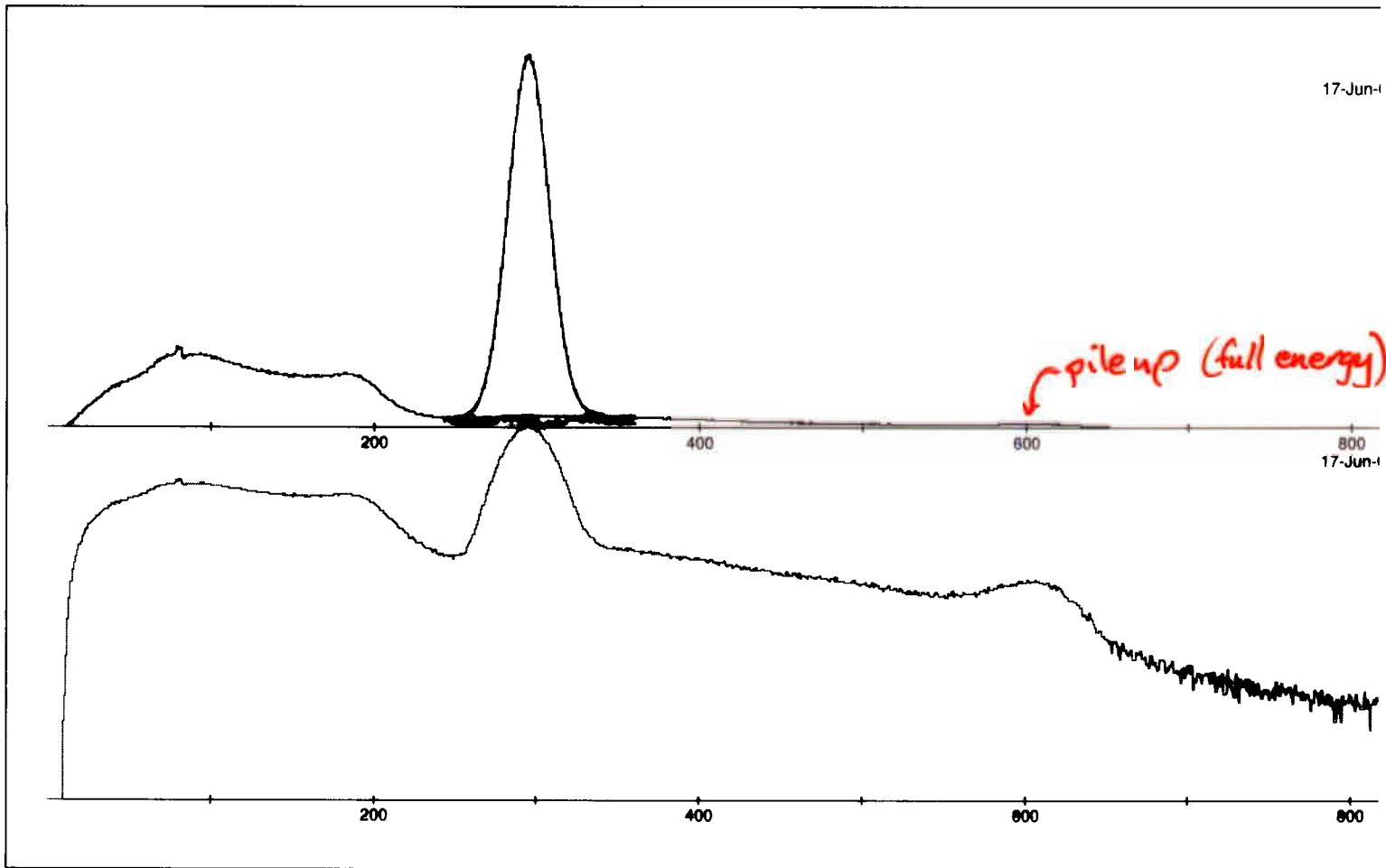


$^{137}\text{Cs}$ ,  $z=10\text{ cm}$  from face of  $\text{NaI}$

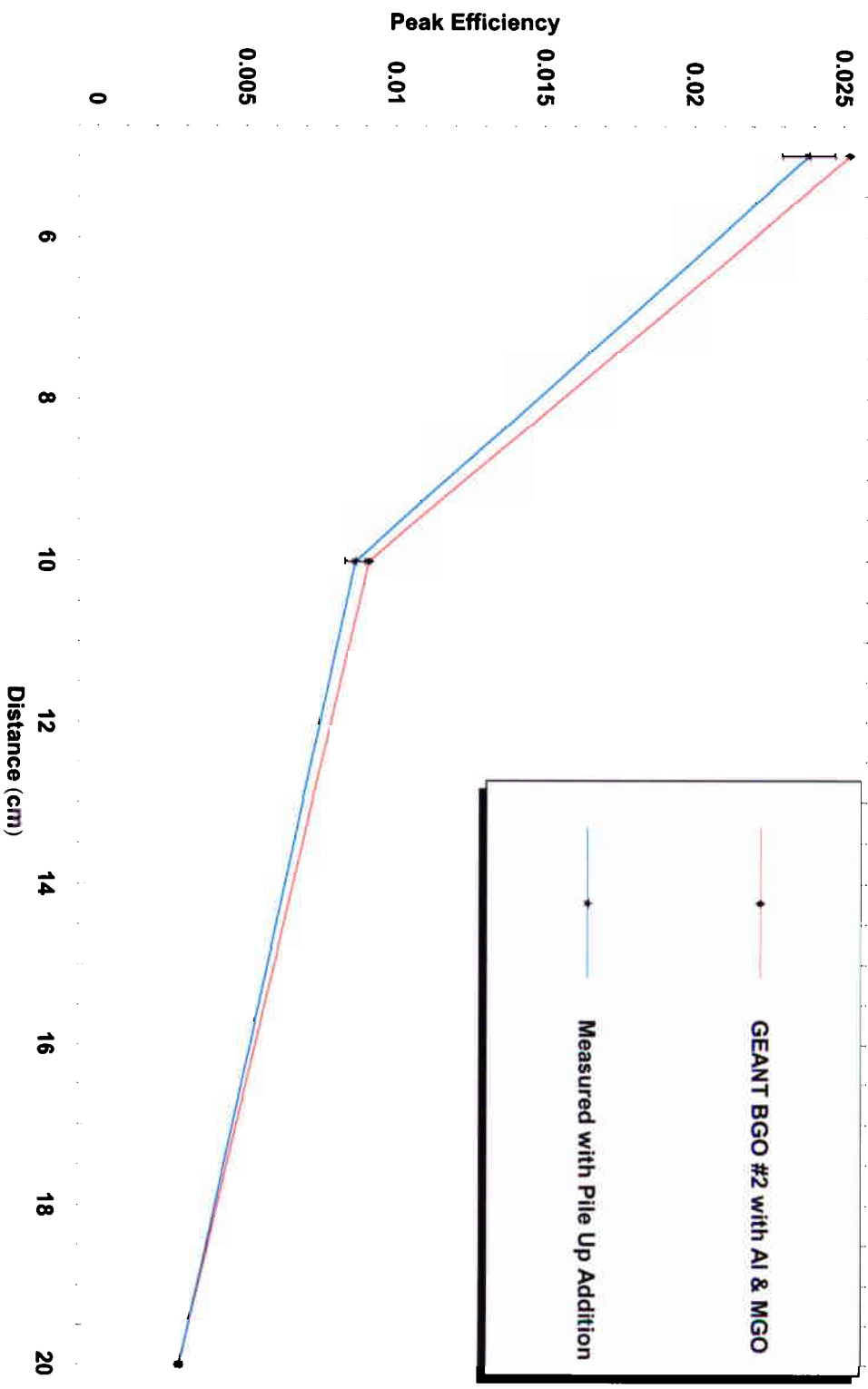


Total Full Energy Counts  $\approx$  photopeak +  $2 \times$  full energy pile up  
+ ( $\frac{1}{2}$  counts to right of peak  
- full energy pile up)

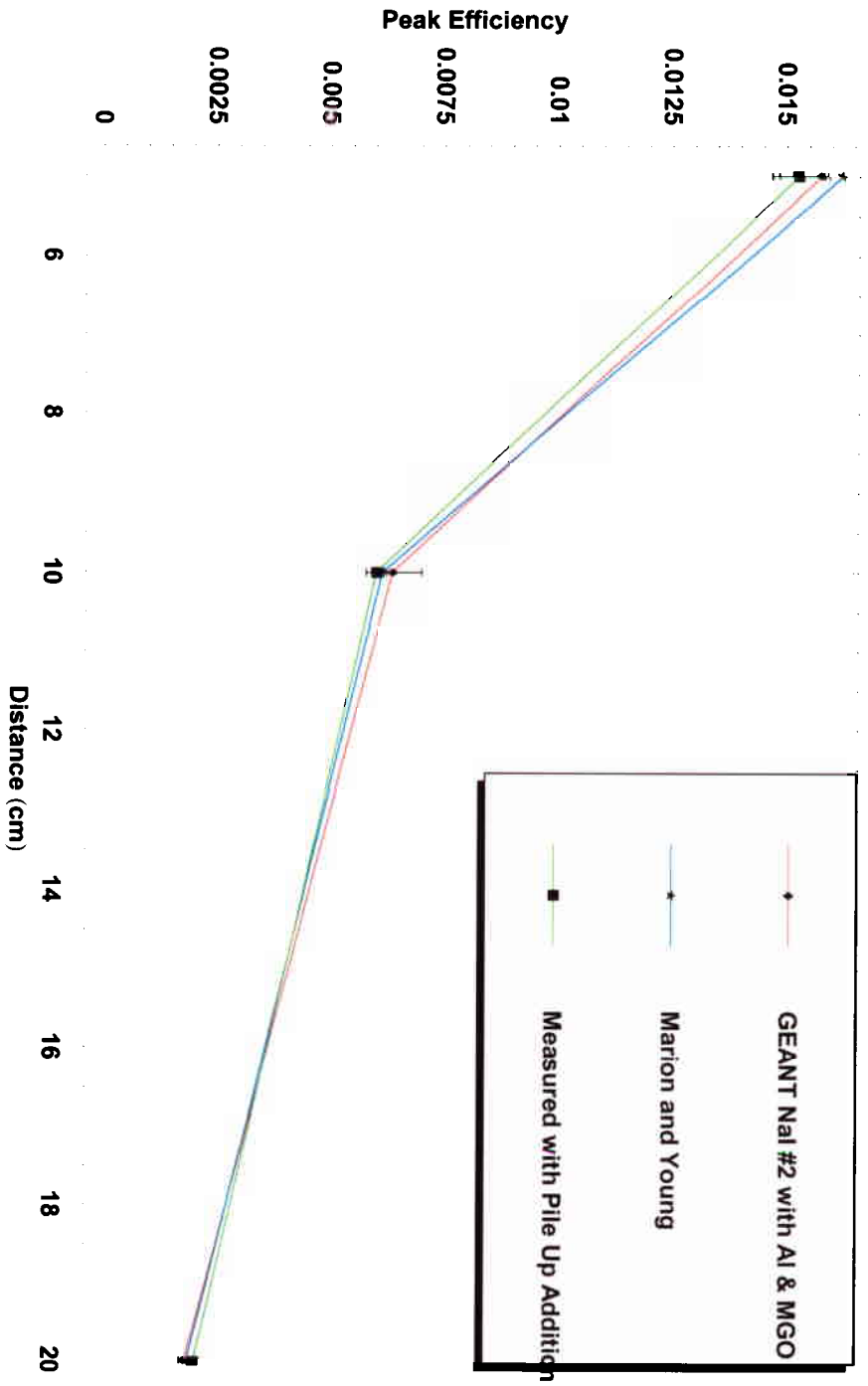
# Gamma Efficiency Simulation and Measurement

- sources of error in data
  - fit errors
  - source activity tolerance (  $^{137}\text{Cs}$ ,  $^{226}\text{Ra}$   $\rightarrow$  3.7%)
- sources of error in simulation
  - tolerances in the dimensions of detector
    - reflector thickness
    - aluminum dimensions

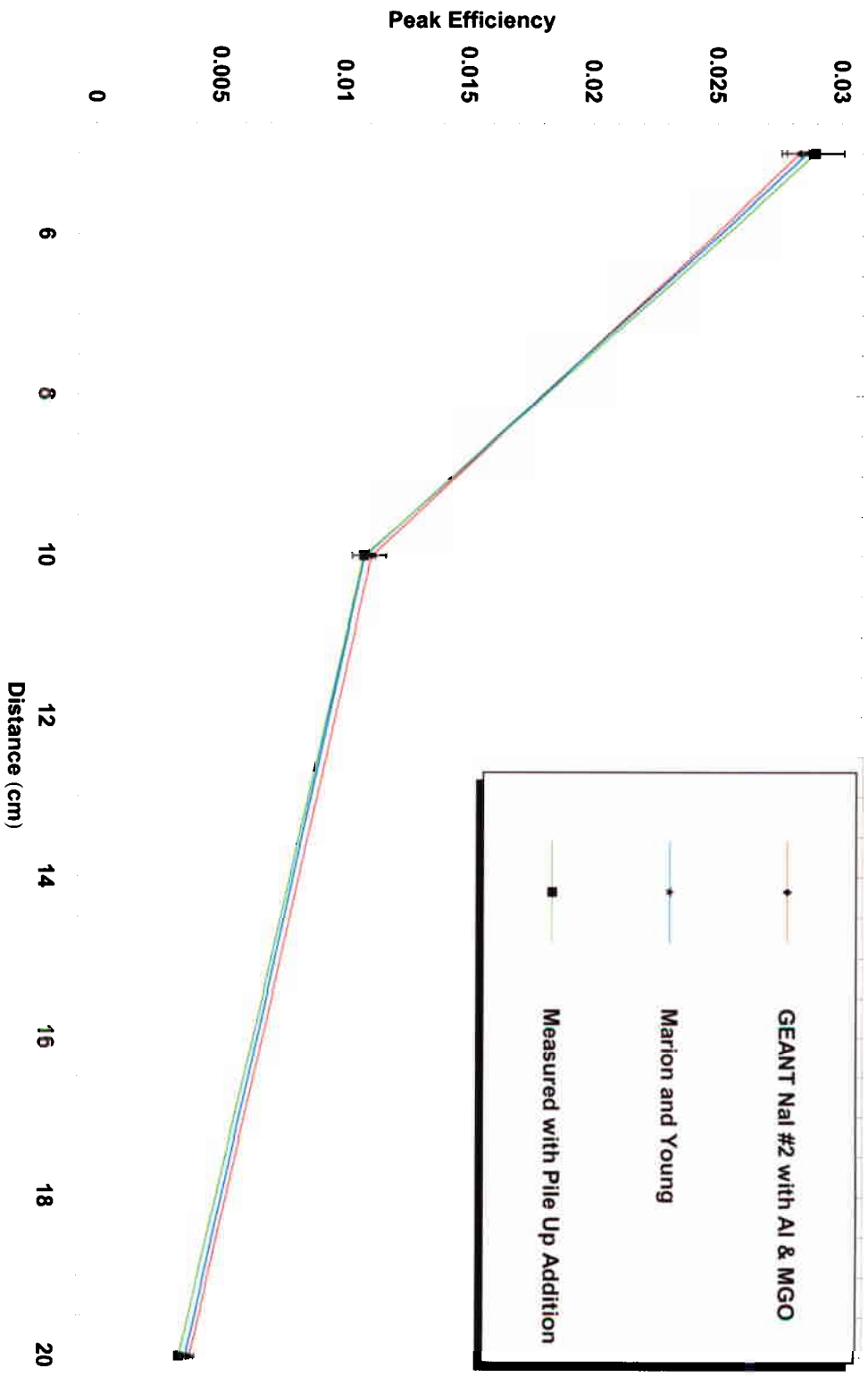
### $^{22}\text{Na}$ , 1.275 MeV, BGO Peak Efficiency, Comparison of Calculated to Measured



# $^{22}\text{Na}$ , NaI Peak Efficiency, Comparison of Calculated to Measured



# <sup>137</sup>Cs, NaI Peak Efficiency, Comparison of Calculated to Measured



# Gamma Efficiency Simulation and Measurement

- AmBe (4.44 MeV) results
  - source strength
    - 28533 y/s (NaI GEANT cross calibration)
    - 31219 y/s (NaI Marion cross calibration)
    - 33144 y/s (10% error) (Croft  $\gamma$  to n<sup>0</sup> ratio)

# Gamma Efficiency Simulation and Measurement

- BGO photopeak efficiency of a single crystal **measured** to be:
  - 0.00132 (NaI GEANT cross calibration)
  - 0.00121 (NaI Marion cross calibration)
  - 0.00113 (10% error) (Croft  $\gamma$  to  $n^0$  ratio)
- BGO photopeak efficiency of a single crystal **simulated** to be:
  - 0.00131 (GEANT simulation)