Figure 1

This is the TAC spectrum between the ^{252}Cf fission chamber and the HPGe detector. The ^{252}Cf fission chamber was delayed and was used as the stop on the TAC and the start was the HPGe detector. Four time regions have been defined and are indicated on the graph by the different colors. The Narrow region is 12.7 ns, centered around the TAC peak. The Wide region is 36.1 ns ,centered around the TAC peak. The Slow Background region is 454 ns, to the left of the TAC peak. The Fast Background is 433.6 ns to the right of the TAC peak.

Figure 2

Shows the energy spectra from 300 to 1700 keV for the different time regions. This energy range is where the obvious interesting stuff happened. What is cool is that the asymmetric peaks are much stronger in the Slow Background spectrum compared to the Narrow or Wide spectra. This suggests that the asymmetric peaks do not occur "promptly" with fission but instead occur more spread out in time. I think this supports the idea of the asymmetric peaks being created by neutron interactions with the Ge of the HPGe detector. The Cf-252 source was 15.2 cm from the HPGe detector with no shielding. It takes a 2 MeV neutron 7.8 ns to travel this distance. The timing resolution of the system appears to be around ~6.5 ns. The Fast Background is sparse with counts but there is no indication of asymmetric peaks. Should do a few time slices of the same width and step through the peak to see if we can learn more.

Figure 3

Same as figure 2 but the data has been normalized to the width of the time region. Just a slightly different way to look at the same data.

Figure 4

Added 6" of borated polyethylene between the ^{252}Cf fission chamber and the HPGe detector. An additional 2" of borated polyethylene completely surrounded the other sides of the fission chamber. So figure 4 shows the normalized yield with and without the borated polyethylene. NBP stands for "No Borated Polyethylene" and BP stands for "Borated Polyethylene". These spectra were normalized to the total number of counts in the Narrow time spectrum. Basically take the total number of counts in the Narrow spectra and divide the counts by that number. The borated polyethylene decreases the intensity of the asymmetric peaks. A further indication that they are caused by neutron interaction with the Ge in the detector.

Figure 5

Turned off the Slow Rise Time (SRT) reject of the HPGe CFD. This figure compares the two TAC spectra. With the SRT-Off you can really see the "reflections". Do not think they are really reflections because they are too far out but they could be retriggering of the ^{252}Cf fission chamber. Did not have time to investigate what was causing it.

Figure 6

Compare the Spectra with the SRT On and Off. These spectra are normalized the same way as they were in figure 4. So the shape of the Narrow spectrum does not change much between SRT

On versus Off and the same is true for the Fast Background spectrum. However the shape of the Slow Background changes significantly.

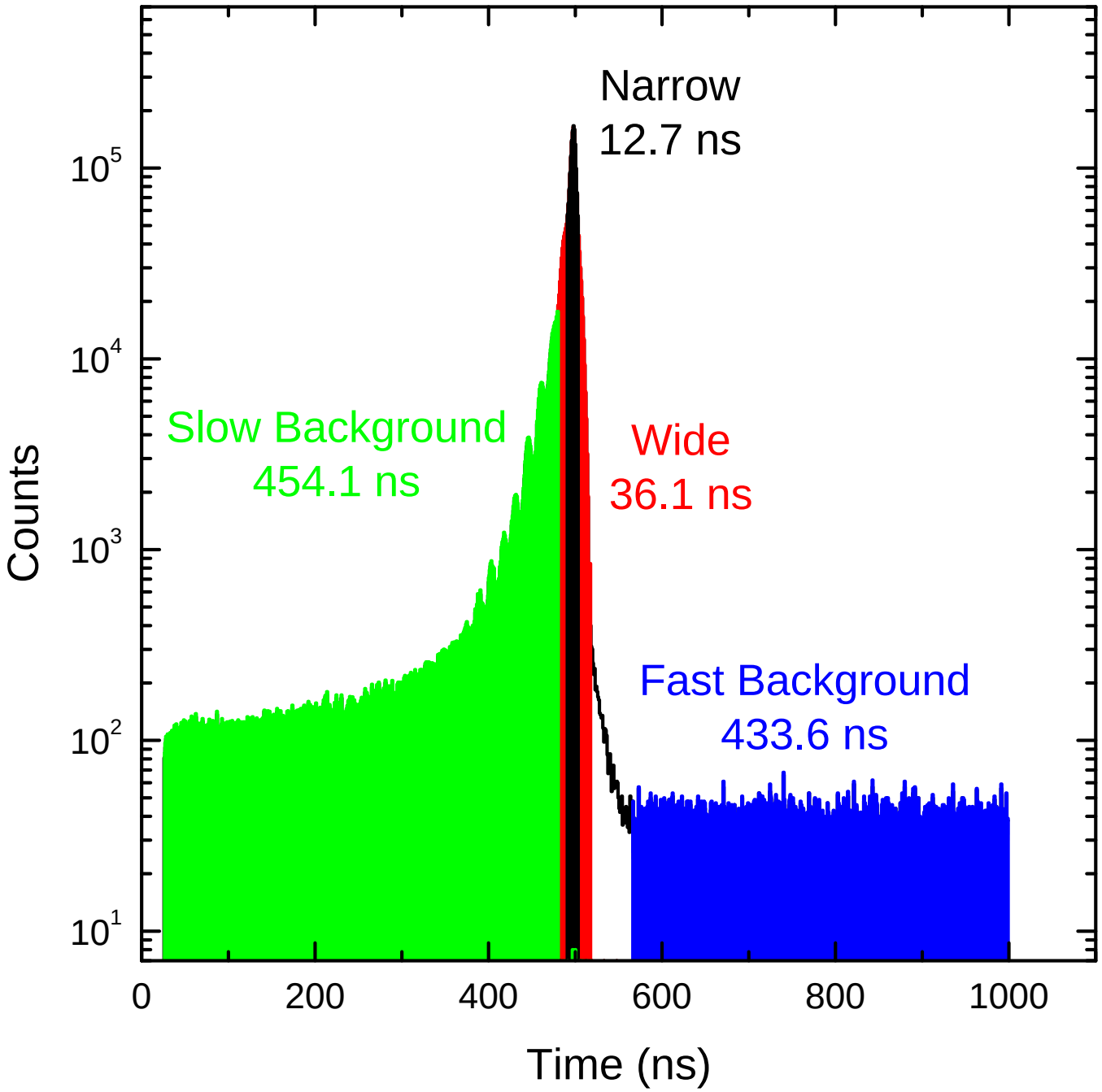
Narrow
12.7 ns
Slow Background
454.1 ns
Wide
36.1 ns
Fast Background
433.6 ns
Counts
Time (ns)
10^5
10^4
10^3
10^2
10^1
0
200
400
600
800
1000

Fig. 1

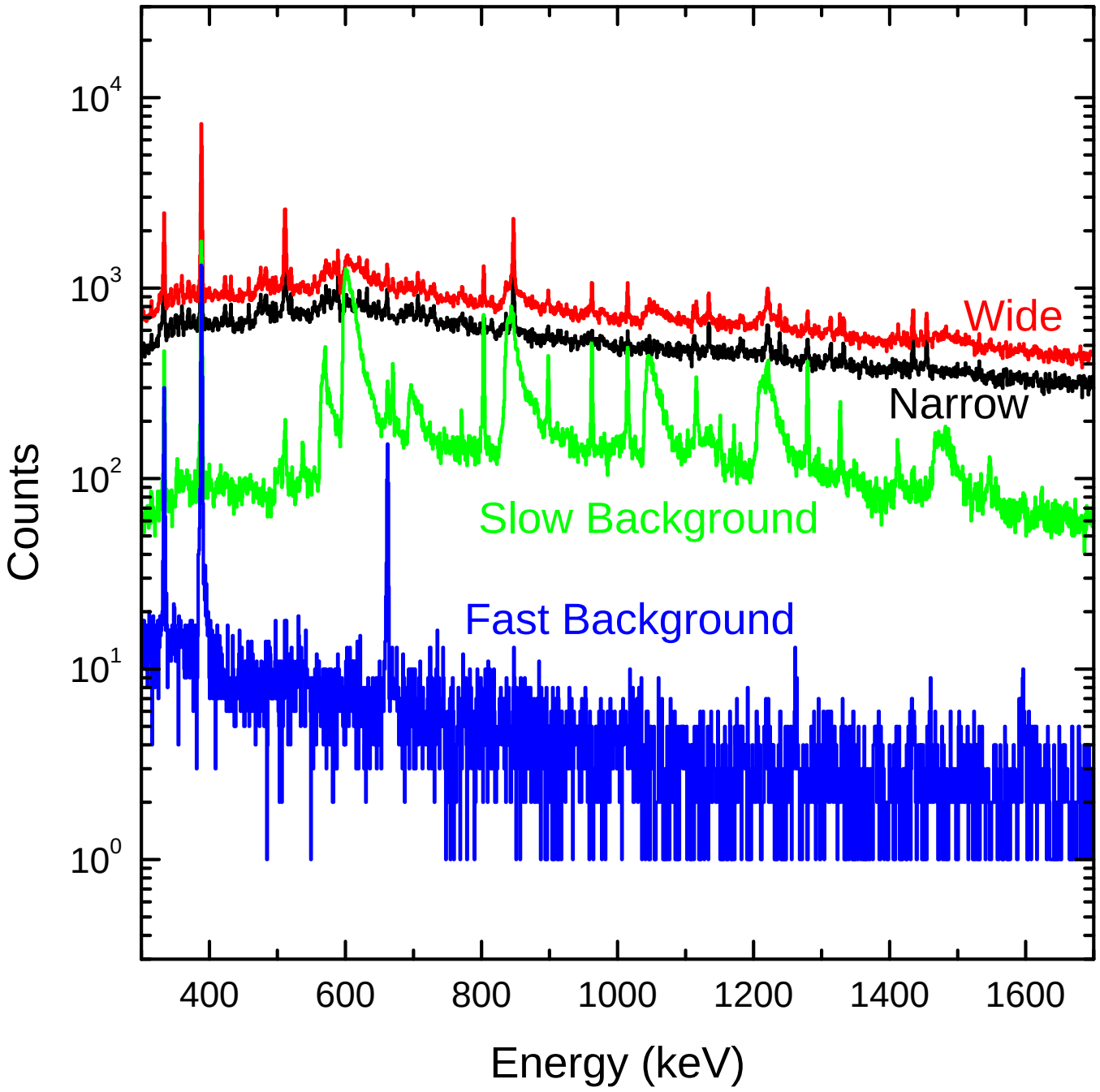
Counts
10^4
10^3
10^2
10^1
10^0
400
600
800
1000
1200
1400
1600
Energy (keV)
Wide
Narrow
Slow Background
Fast Background

Fig. 2

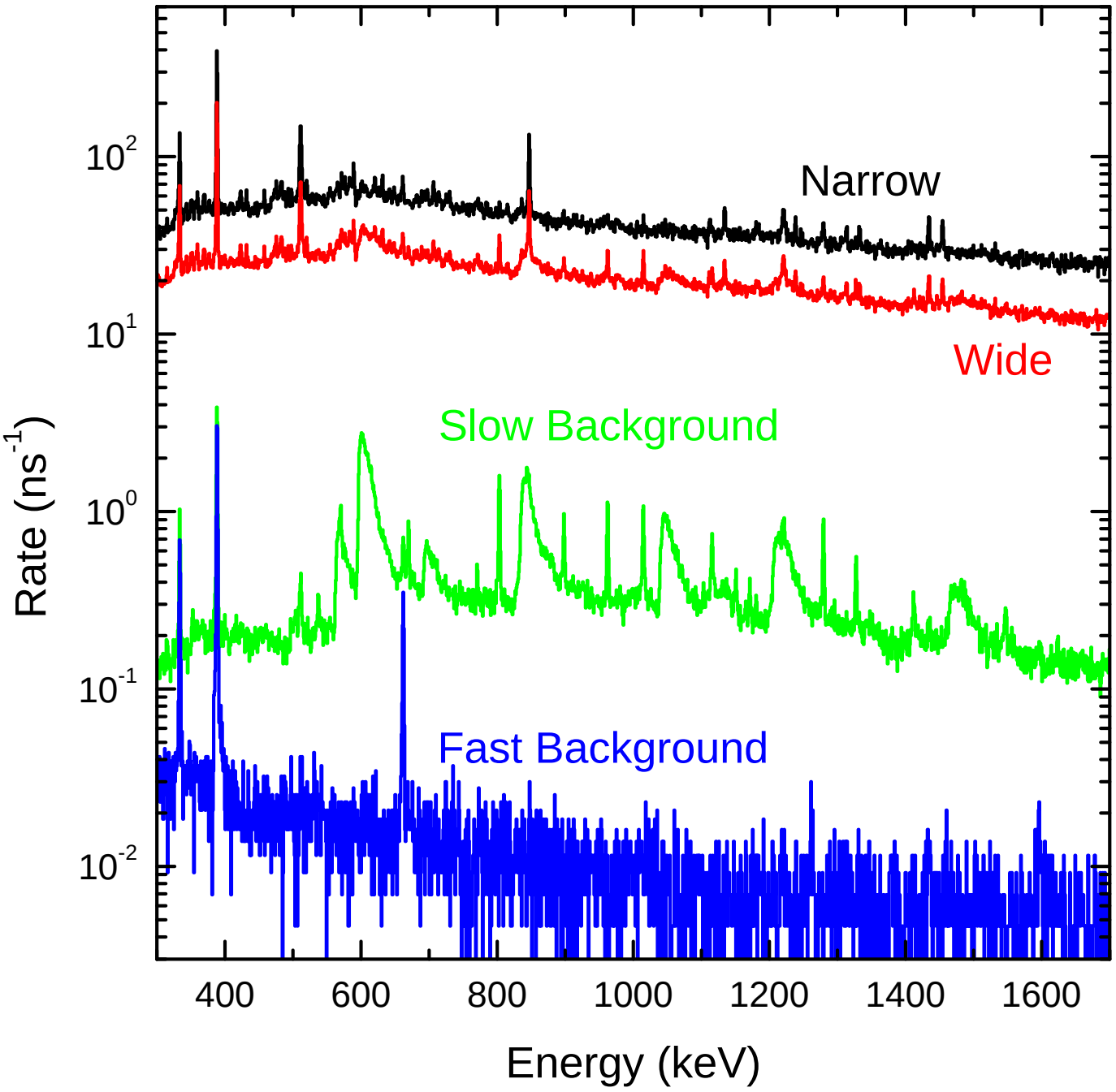
Narrow
Wide
Slow Background
Fast Background
Rate (ns^{-1})
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
400
600
800
1000
1200
1400
1600
Energy (keV)

Fig. 3

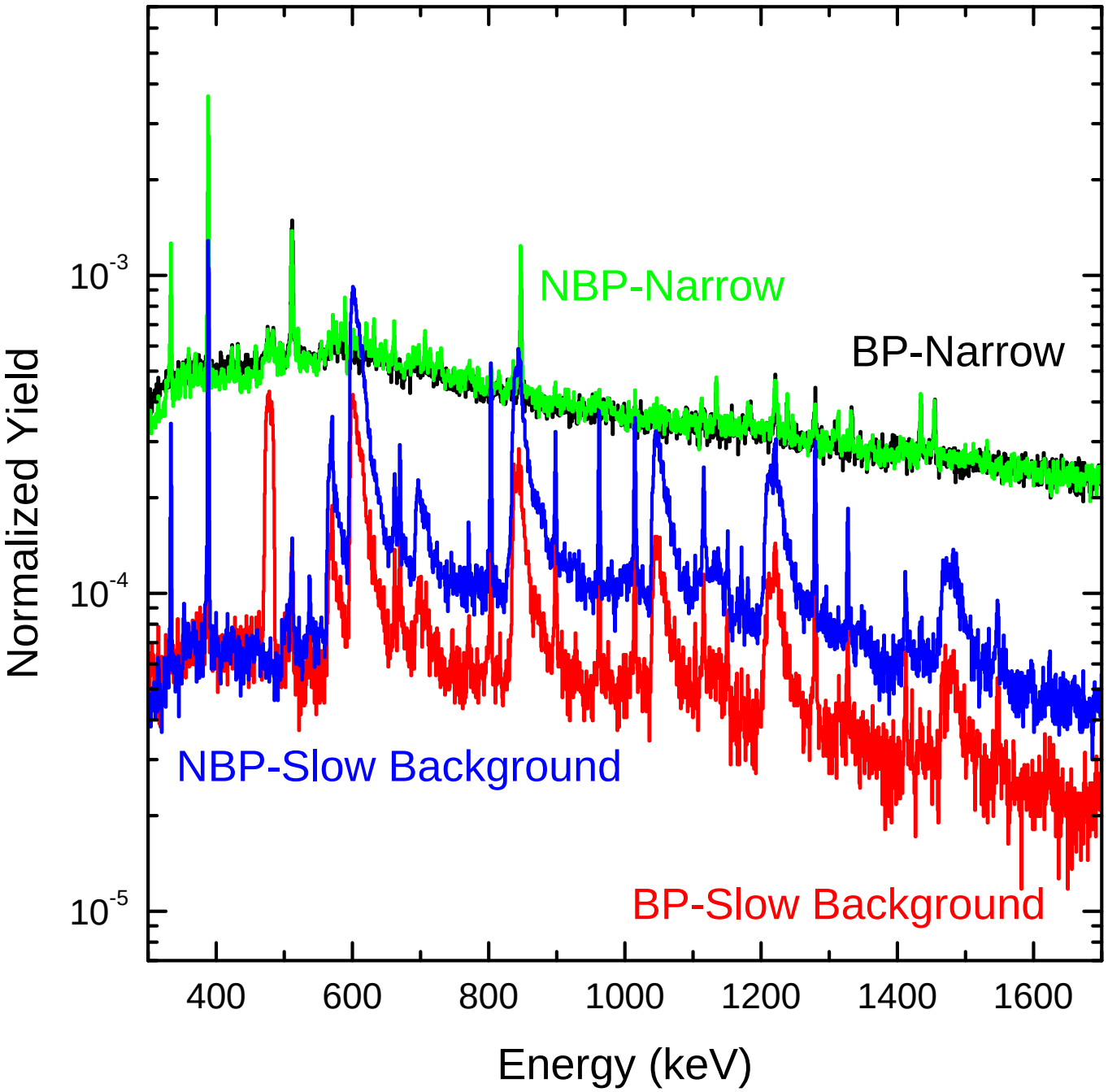
Normalized Yield
10-3
10-4
10-5
400
600
800
1000
1200
1400
1600
Energy (keV)
NBP-Narrow
BP-Narrow
NBP-Slow Background
BP-Slow Background

Fig. 4

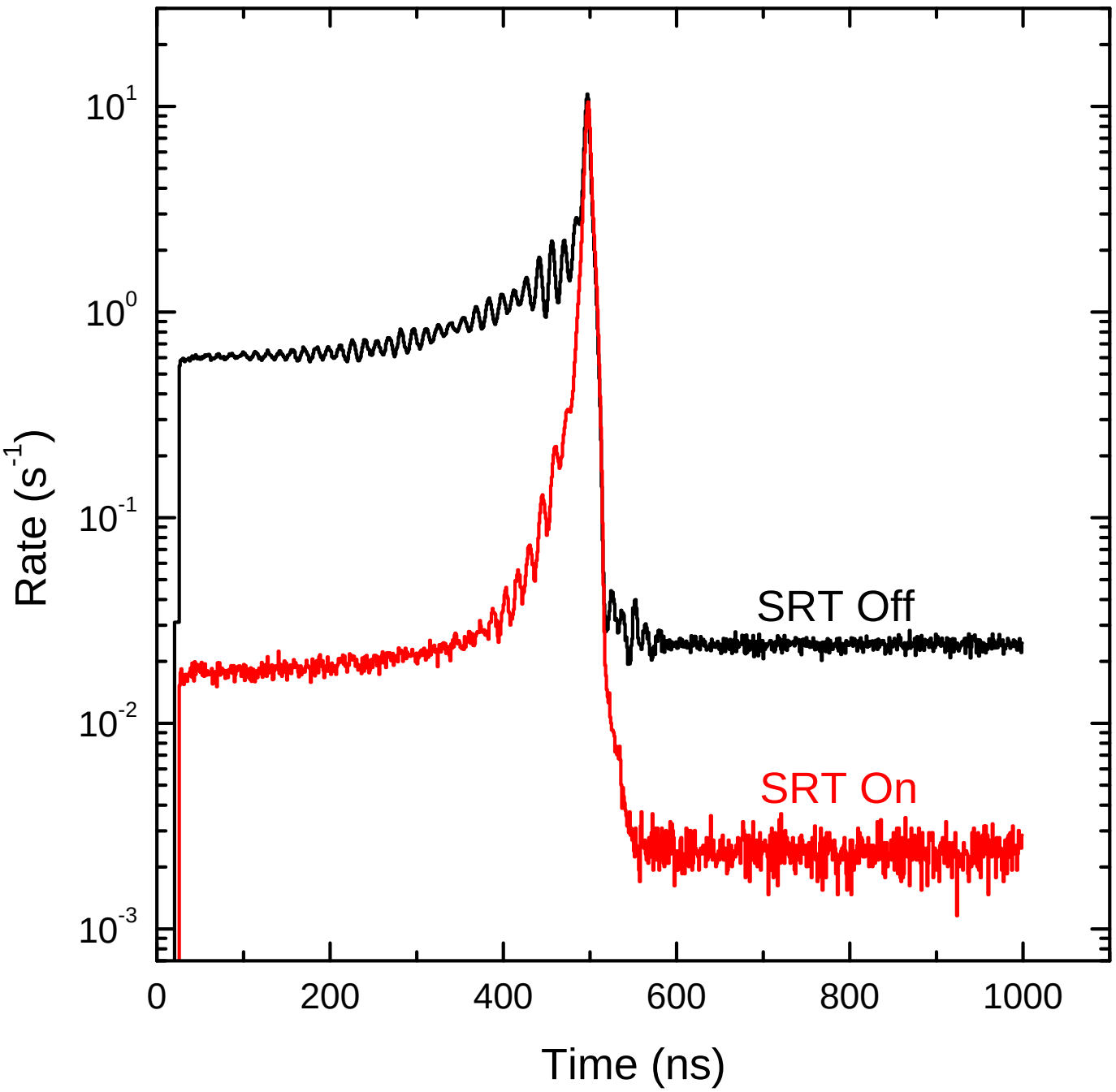
Rate (s-1)
10^1
10^0
10^-1
10^-2
10^-3
0
200
400
600
800
1000
Time (ns)
SRT Off
SRT On

Fig. 5

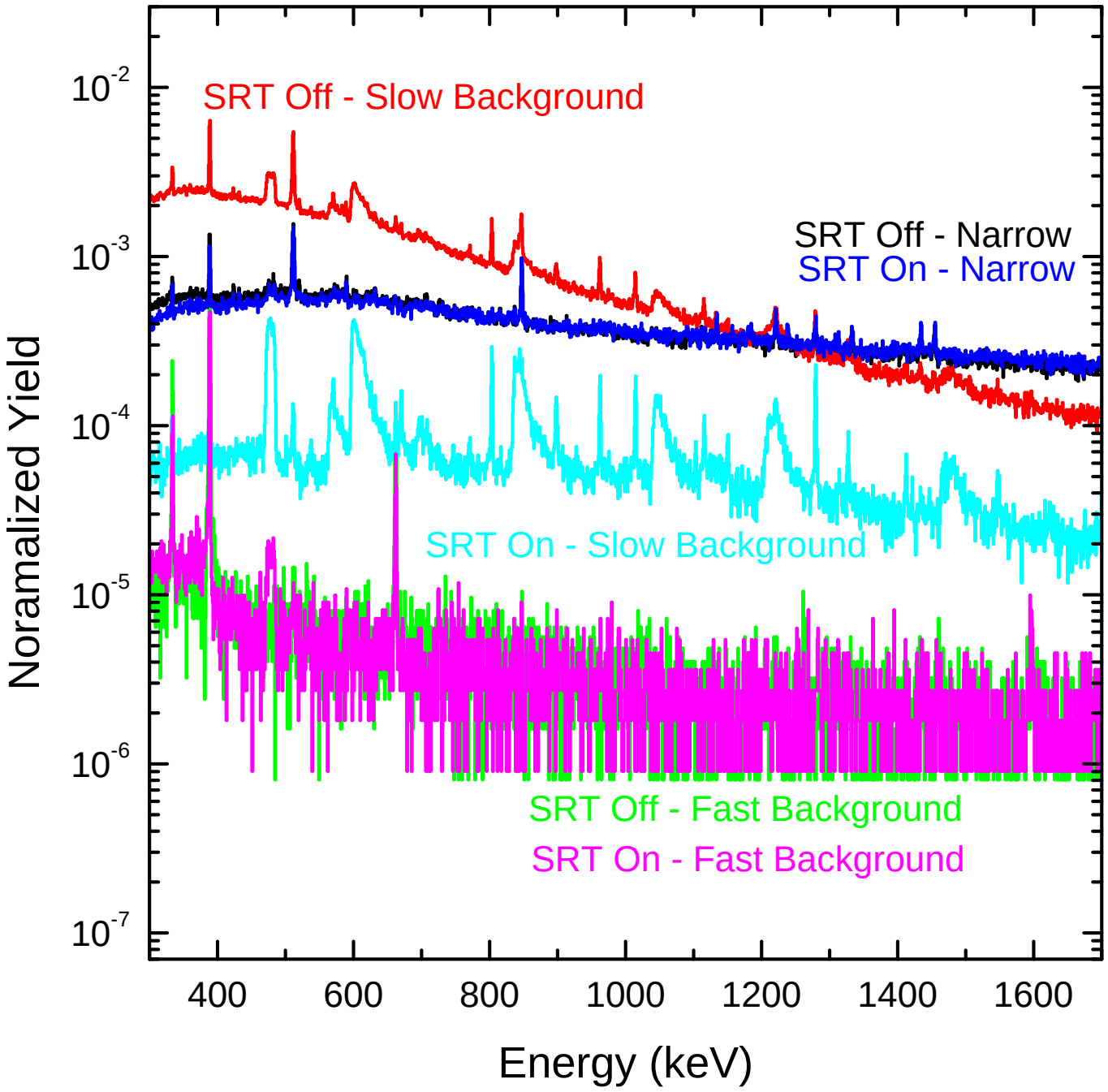
SRT Off - Slow Background
SRT Off - Narrow
SRT On - Narrow
SRT On - Slow Background
SRT Off - Fast Background
SRT On - Fast Background
Noramalized Yield
Energy (keV)
10-2
10-3
10-4
10-5
10-6
10-7
400
600
800
1000
1200
1400
1600

Fig. 6