Contents

HPGe Capstone

```
clear; clc;
```

Calibrated energy spectrum with features identified.

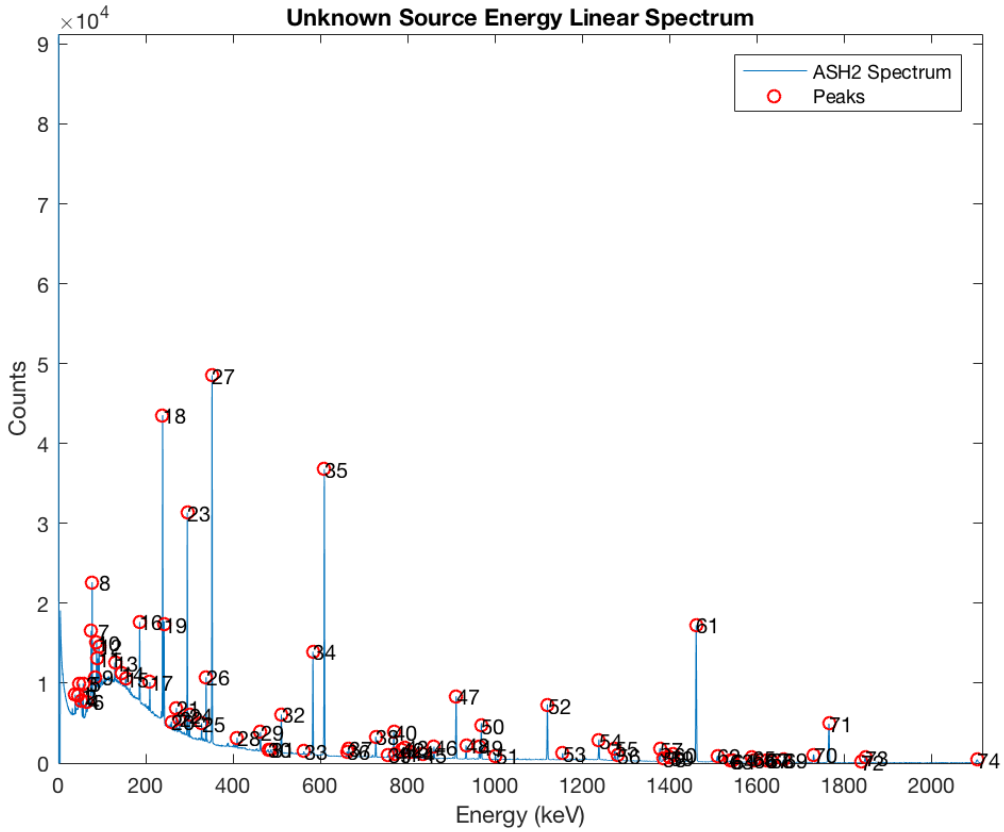
```
load('ASH2.mat')
Channel = linspace(1,8192,8192)';
Energy = .2583.*Channel + .0431;
Net_Counts = abs(ASH2-Background);

Peak_Counts = zeros(length(Peak_Energy),1);
for i = 1:length(Peak_Channel)
    j = round(Peak_Channel(i));
    Peak_Counts(i) = Net_Counts(j);
end

Col = [{'Peak'},{'Energy (keV)'},{'Isotope'}];
ISO = [Col;[num2cell(linspace(1,74,74)'),num2cell(Peak_Energy),isotopes]];
disp(ISO)

% Peak_Energy_x = [];
% Peak_Counts_y = [];
% isotopes = [];
% for i = 1:length(Peak_Counts)
%     if floor(Peak_Energy(i)) >= 57 && floor(Peak_Energy(i)) <= 63
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{240}Am'];
%     elseif floor(Peak_Energy(i)) >= 77 && floor(Peak_Energy(i)) <= 83
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{109}Cd'];
%     elseif floor(Peak_Energy(i)) >= 119 && floor(Peak_Energy(i)) <= 125
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 57}Co'];
%     elseif floor(Peak_Energy(i)) >= 156 && floor(Peak_Energy(i)) <= 162
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{123}Te'];
%     elseif floor(Peak_Energy(i)) >= 317 && floor(Peak_Energy(i)) <= 323
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 51}Cr'];
```

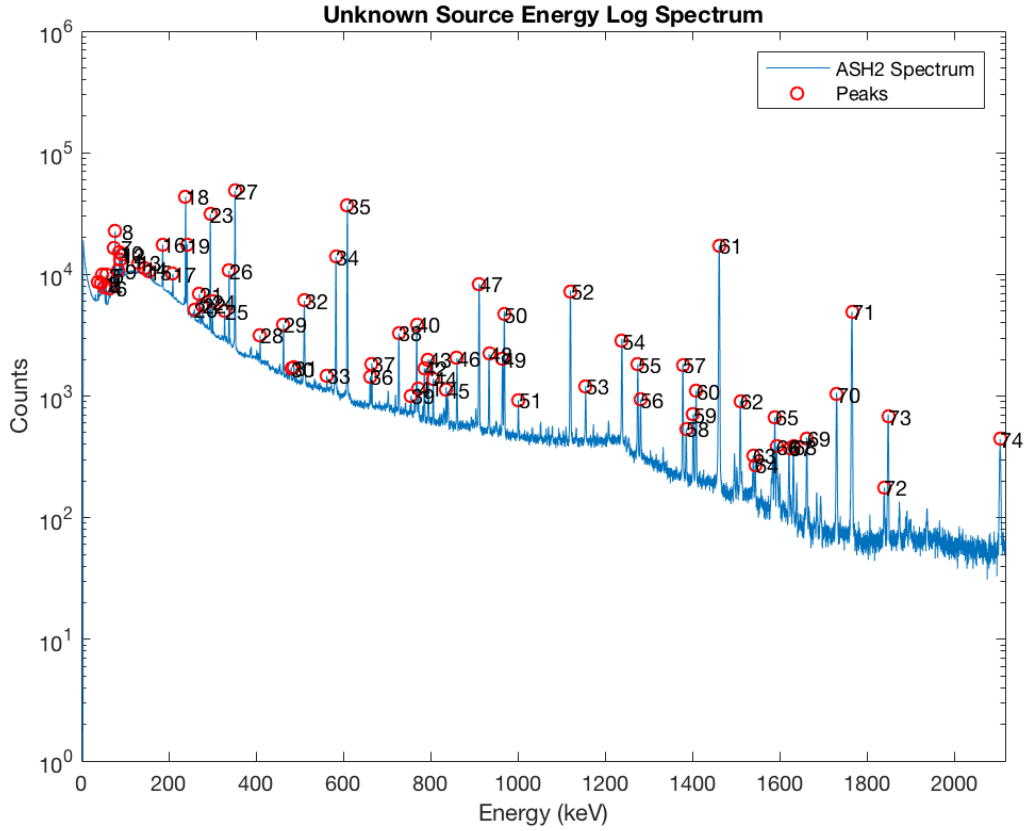
```
%     elseif floor(Peak_Energy(i)) >= 389 && floor(Peak_Energy(i)) <= 395
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{113}Sn'];
%     elseif floor(Peak_Energy(i)) >= 511 && floor(Peak_Energy(i)) <= 517
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 85}Sr'];
%     elseif floor(Peak_Energy(i)) >= 659 && floor(Peak_Energy(i)) <= 665
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{137}Cs'];
%     elseif floor(Peak_Energy(i)) >= 895 && floor(Peak_Energy(i)) <= 1001
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 88}Y '];
%     elseif floor(Peak_Energy(i)) >= 1175 && floor(Peak_Energy(i)) <= 1181
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 60}Co'];
%     elseif floor(Peak_Energy(i)) >= 1330 && floor(Peak_Energy(i)) <= 1336
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 60}Co'];
%     elseif floor(Peak_Energy(i)) >= 1833 && floor(Peak_Energy(i)) <= 1839
%         Peak_Energy_x = [Peak_Energy_x;Peak_Energy(i)];
%         Peak_Counts_y = [Peak_Counts_y;Peak_Counts(i)];
%         isotopes = [isotopes;'^{ 88}Y '];
%     end
% end

figure('Name','Unknown Source Energy Linear Spectrum','NumberTitle','off')
plot(Energy,Net_Counts,Peak_Energy,Peak_Counts,'ro')
title('Unknown Source Energy Linear Spectrum')
xlabel('Energy (keV)')
ylabel('Counts')
legend('ASH2 Spectrum','Peaks')
axis([0 inf 0 inf])
text(Peak_Energy,Peak_Counts,num2str(linspace(1,74,74)'))

figure('Name','Unknown Source Energy Log Spectrum','NumberTitle','off')
semilogy(Energy,Net_Counts,Peak_Energy,Peak_Counts,'ro')
title('Unknown Source Energy Log Spectrum')
xlabel('Energy (keV)')
ylabel('Counts')
legend('ASH2 Spectrum','Peaks')
axis([0 inf 0 10^6])
text(Peak_Energy,Peak_Counts,num2str(linspace(1,74,74)'))
```

```
    'Peak'    'Energy (keV)'    'Isotope'
    [   1]    [     38.6200]    ''
    [   2]    [     46.0400]    ''
```

[3]	[47.9400]	''
[4]	[53.3300]	''
[5]	[56.7100]	''
[6]	[63.6600]	''
[7]	[75.1300]	'PB-212/PB-214'
[8]	[77.3900]	'PB-212/PB-214'
[9]	[84.3500]	'TH-231'
[10]	[87.5000]	'PB-212/PB-214/CD-...'
[11]	[90.1800]	'U-235/AC-228/TH-2...'
[12]	[93.1200]	'AC-228/U-235/TH-227'
[13]	[129.3200]	'AC-228'
[14]	[144.2500]	'U-235'
[15]	[154.3800]	'XE-138'
[16]	[186.3600]	'RA-226/U-235'
[17]	[209.5200]	'AC-228'
[18]	[238.8400]	'PB-212'
[19]	[242.2000]	'PB-214/XE-138/SR-92'
[20]	[259.1200]	'XE-138/SR-93'
[21]	[270.3600]	'AC-228/RN-219'
[22]	[277.5600]	''
[23]	[295.3800]	'PB-214'
[24]	[300.2600]	'PB-212/PA-231/TH-227'
[25]	[328.0700]	'AC-228/LA-140'
[26]	[338.4800]	'AC-228'
[27]	[351.9900]	'PB-214/BI-211'
[28]	[409.4400]	'AC-228/CS-138'
[29]	[463.0200]	'AC-228/CS-138/SB-125'
[30]	[480.6000]	''
[31]	[487.0800]	'LA-140'
[32]	[510.7600]	''
[33]	[562.4800]	'CS-134/AS-76'
[34]	[583.1200]	''
[35]	[609.2200]	'BI-214'
[36]	[661.4500]	'CS-137'
[37]	[665.2800]	''
[38]	[727.2200]	'BI-212'
[39]	[755.2300]	''
[40]	[768.3000]	'BI-214'
[41]	[772.1700]	'I-132/W-187'
[42]	[785.6200]	'BI-212/PB-214'
[43]	[794.7000]	'AC-228'
[44]	[806.0500]	'BI-214'
[45]	[835.5500]	'KR-89/KR-88/MN-54'
[46]	[860.5300]	''
[47]	[911.0500]	'AC-228'
[48]	[933.9000]	'BI-214/Y-92'
[49]	[964.6400]	'AC-228/EU-152'
[50]	[968.8900]	'AC-228/SB-124'
[51]	[1.0010e+03]	'PA-234M'
[52]	[1.1202e+03]	'BI-214/SC-46'
[53]	[1.1550e+03]	'BI-214'
[54]	[1.2383e+03]	'BI-214'
[55]	[1.2746e+03]	'NA-22/KR-89'

```
[  56]    [  1.2810e+03]    'BI-214'
[  57]    [  1.3778e+03]    'BI-214'
[  58]    [  1.3855e+03]    'BI-214'
[  59]    [  1.4017e+03]    'BI-214'
[  60]    [  1.4081e+03]    'BI-214/EU-152'
[  61]    [  1.4611e+03]    'K-40'
[  62]    [  1.5095e+03]    'I-124/BI-214'
[  63]    [  1.5388e+03]    'RB-89'
[  64]    [  1.5438e+03]    ''
[  65]    [  1.5885e+03]    'AC-228'
[  66]    [  1.5926e+03]    ''
[  67]    [  1.6213e+03]    'BI-212'
[  68]    [  1.6310e+03]    ''
[  69]    [  1.6617e+03]    'BI-214'
[  70]    [  1.7302e+03]    'BI-214'
[  71]    [  1.7651e+03]    'BI-214'
[  72]    [  1.8393e+03]    ''
[  73]    [  1.8481e+03]    'BI-214'
[  74]    [  2.1045e+03]    ''
```





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