

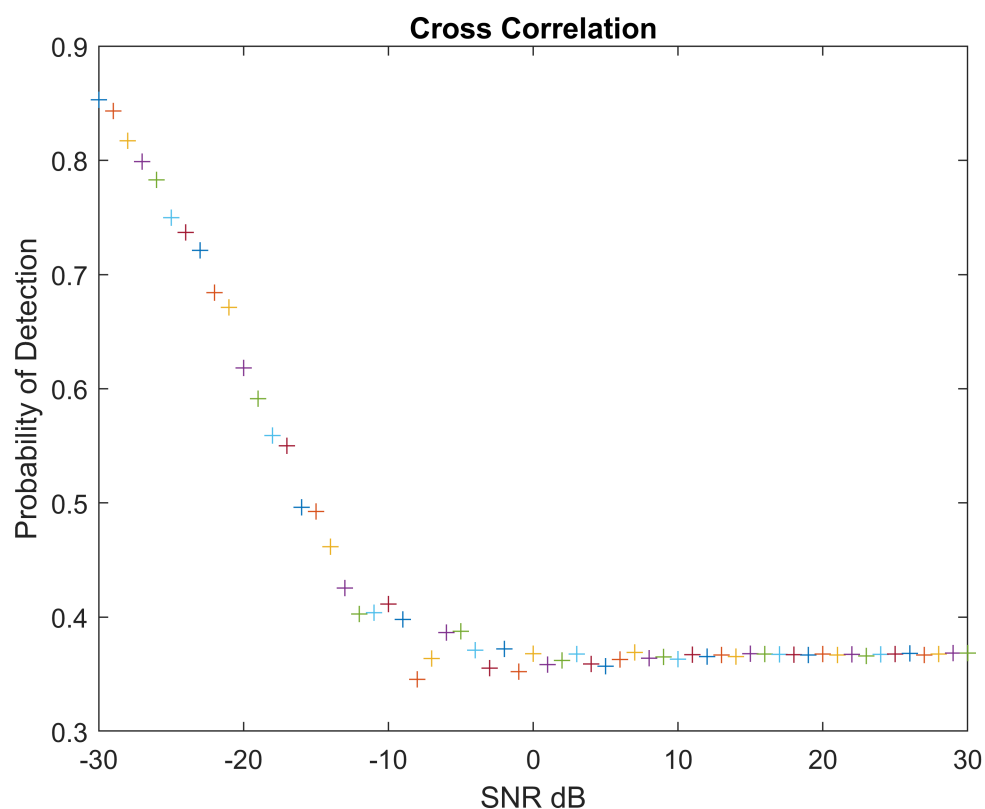
# Cross Correlation Probability of Detection

```
clear                                % Clear all data stored in variables
Am = 1;                             % 1V Amplitude
SR = 48000;                         % 48 KHz Smapling Rate
f0 = 20e3;                          % 20 KHz
duration = (127/SR);                % ~ 2.6 ms
t = 0:1/SR:duration;                % Time Vector
```

```
sinusPulse = Am*sin(2*pi*f0*t); % Signal with 20 KHz
```

```
mySNR = -30:30;
threshold = 24;
```

```
find_PD_2C(sinusPulse,threshold,mySNR)
```



```
function find_PD_2C(yourSignal,threshold,snr)
    N = length(yourSignal);
    for i = 1:length(snr)
```

```

    Pd_buff(100) = 0;
    for j = 1:100
        noisySignal = awgn(yourSignal,snr(i));
        [acor, ~] = xcorr(noisySignal,yourSignal);
        Pd_buff(j) = sum(abs(acor) > threshold)/length(acor);
    end
    Pd = sum(Pd_buff)/100;
    plot(snr(i),Pd,'+')
    hold on
end
title('Cross Correlation')
ylabel('Probability of Detection')
xlabel('SNR dB')
hold off
end

```