Generate our Quantum Correlator off the density-density correlators:

Lists:

```
phi = 0:pi/99:pi;
E_list = 0.*phi;
```

Parameters:

? = L - mode occupancy.

? - phase of interferometer.

T_{max} - maximum number of generated particle

cycles = C - number of simulated tests used to perform correlation.

QE = R - retention rate / quantum efficiency.

dark_rate = D - fraction of tests which return a non-experimental count.

? = B - decay width of gaussian blur in detection uncertainty (as a fraction of halo radius).

phys - Quantum ('Q') or Classical ('C') physics to be used.

Y_{bias} - with a classical beam splitter, the R.H.S. bias towards Y (up)

X_{bias} - " " , the L.H.S. bias towards X (up)

```
lambda = 0.1;
% phi =   ;
Tmax = 10;
cycles = 2E5;
QE = 8;
dark_rate = 3e-2;
sigma = 0.05;
phys = 'Q';
Y_bias = .5;
X_bias = .5;
```

Evaluation for each phase:

```
for p = 1:length(phi)
    [g_YX,g_WZ,g_YZ,g_XW] = correlators3(lambda,phi(p),Tmax,cycles,QE,dark_rate,sigma,sqrt(2),phys,Y_bias,X_bias);
    E_list(p) = (g_YX+g_WZ-g_YZ-g_XW)/(g_YX+g_WZ+g_YZ+g_XW);
    percent = 100*p/length(phi)
end
```

Generate Plot / Image:

```
plot(phi,E_list)
xticks([0,pi/3,2*pi/3,pi,4*pi/3,5*pi/3,2*pi])
xticklabels(["0","\pi/3","2\pi/3","\pi","4\pi/3","5\pi/3","2\pi"])
xlabel("Phase ($\phi$)","Interpreter",'latex','FontSize',20)
ylabel("Quantum Correlator ($E(\phi)$)","Interpreter","latex",'FontSize',20)
title({"Quantum Correlator vs Phase","$\lambda = $" + string(lambda) + ", $R =$" + string(QE)+"\%, $D = $" + " "+num2str(dark_rate, '
```

Write to File:

```
A = [phi; E_list];
name = erase('R'+string(QE)+'_D'+num2str(dark_rate,'%.0e')+'_B'+string(sigma)+'_C'+num2str(cycles,'%.0e')+'_L'+string(lambda),'.');
data = fopen(name+'.txt','w');
fprintf(data,'%6s %12s\n','\phi','E(\phi)');
fprintf(data,'%6.4f %12.8f\n',A);
fclose(data);
```