1 HW 7: Two-Body Scattering

Your total number of points for this homework is (19/20 P). If you have any questions feel free to write me an email (s6nnschl@uni-bonn.de).

Exercise 7.1:

Correct. (4/4 P)

Exercise 7.2:

Your implementation looks correct. However, it can have advantages to implement single functions for the V- and A-matrix elements and the generation of the $N \times N$ matrices that are put into the solver. This could simplify your code. (7/7 P)

Exercise 7.3:

Correct, also that you have found that for large $p_{\max}$ values the contribution of the principal value integral is small. However, if the principal value integral is omitted, the convergence is driven by the $1/(q^2 - p''^2)$ term. So in general you should really take this integral into account. (3/3 P)

Exercise 7.4:

In principle your implementation looks correct but you should realize that the phase shift is not continues for $l = 0$ at low energies. This is why you should add 180 deg at low energies when the phase shift is negative (-1 P). In total (2/3 P).

Exercise 7.5:

The analytical part is correct. Also your implementation looks correct and if I adjust your parameters and plot ranges (e.g. `ax.set_xlim(np.cos(0),np.cos(175))`) I am able to produce a plot similar to the one I showed in the previous tutorial. In total (3/3 P).