

Problem Set 8 - LV 141.A55 QISS - 23.5.2016

1. Cooper-pair box

- (a) Create a Python function that returns the Cooper-pair box Hamiltonian for the charge states $-n_{max}, \dots, n_{max}$. The function header should look like that:

```
def CPB(EJ, Ec, ng, nmax):  
    ...  
    return Hamiltonian
```

- (b) Calculate the first four energy bands of a Cooper-pair box (Energy versus n_g) for a ratio of $E_J/E_c = 4$.
- (c) Check the validity of the Cooper-pair box qubit approximation for the same ratio of $E_J/E_c = 4$.