Atoms:

H   H   H   H   H   H   H   H   H   H   PBC
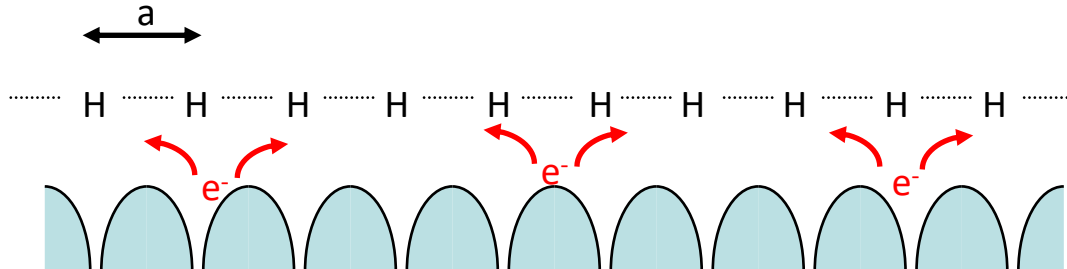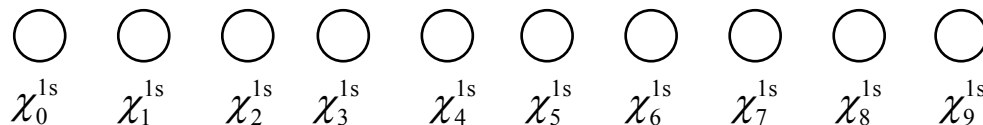
$V(x) = V(x + na)$

$\forall n \in \text{integers}$

Potential:
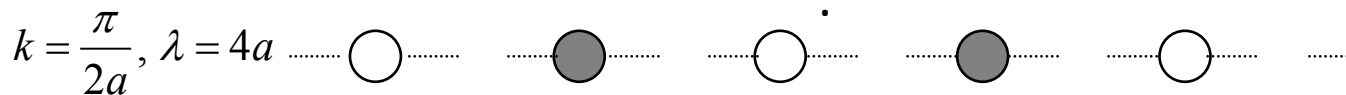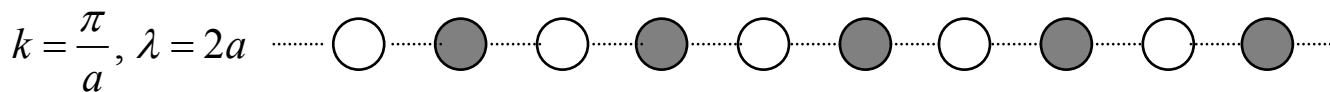
Basis:

χ_0^{1s} χ_1^{1s} χ_2^{1s} χ_3^{1s} χ_4^{1s} χ_5^{1s} χ_6^{1s} χ_7^{1s} χ_8^{1s} χ_9^{1s}

Wavefunctions:

$k = 0, \lambda \rightarrow \infty$
$\qquad \psi^0 = \sum_n e^0 \chi_n^{1s} = \sum_n \chi_n^{1s}$

$k = \dfrac{\pi}{2a}, \lambda = 4a$
$\qquad \psi^{\pi/2a} = \sum_n e^{i\pi n/2} \chi_n^{1s}$
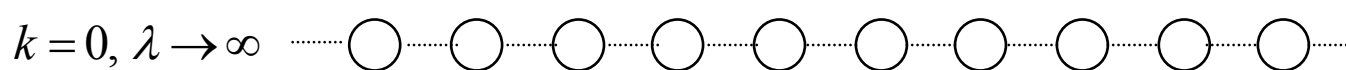
$k = \dfrac{\pi}{a}, \lambda = 2a$
$\qquad \psi^{\pi/a} = \sum_n e^{i\pi n} \chi_n^{1s} = \sum_n (-1)^n \chi_n^{1s}$

Bloch's Theorem: $\qquad \psi^k = \sum_n e^{ikna} \chi_n, \ \ k \leq \left| \dfrac{\pi}{a} \right|$ $\qquad$ (recall e^{ikr} is like a cosine function)