BRIEF SUMMARY OF ELASTIC SCATTERING THEORY

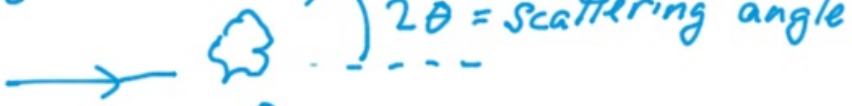
Plane-waves

$e^{i\bar{k}_i \cdot r}$

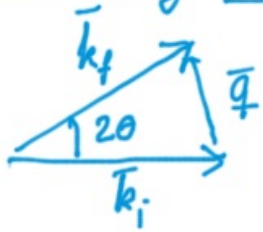
$e^{i\bar{k}_f r}$ } detector

2θ = scattering angle

↕ scattering Object



Scattering Triangle



$\Delta\bar{k} = \bar{q} = \bar{k}_f - \bar{k}_i = 2|k_i|\sin\theta$

SCATTERING PROBABILITY

FERMI GOLDEN RULE

$$P = 2\pi |\langle k_f | V(r) | k_i \rangle|^2 \delta(E_f - E_i)$$

FORM FACTOR

$$F(q) = \langle k_f | V(r) | k_i \rangle$$

$$= \int e^{-i\bar{k}_f \cdot r} V(r) e^{i\bar{k}_i \cdot r} dr$$

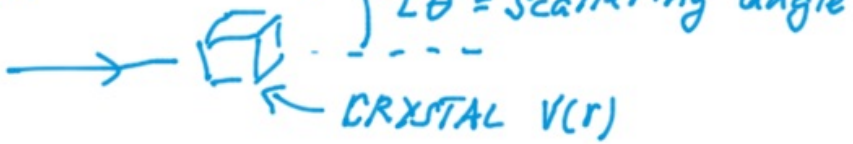
$$= V(q)$$

= FOURIER Trans of $V(r)$

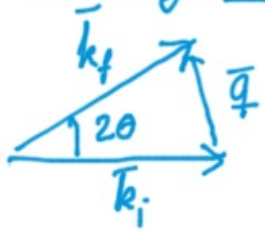
BRIEF SUMMARY OF ELASTIC SCATTERING THEORY

Plane-waves

$e^{i\bar{k}_i \cdot r}$ $\quad$ $e^{i\bar{k}_f r}$ ⟩ detector



Scattering Triangle



$$\Delta\bar{k} = \bar{q} = \bar{k}_f - \bar{k}_i = 2|k_i|\sin\theta$$

SCATTERING PROBABILITY

FERMI GOLDEN RULE

$$P = 2\pi |\langle k_f | V(r) | k_i \rangle|^2 \delta(E_f - E_i)$$

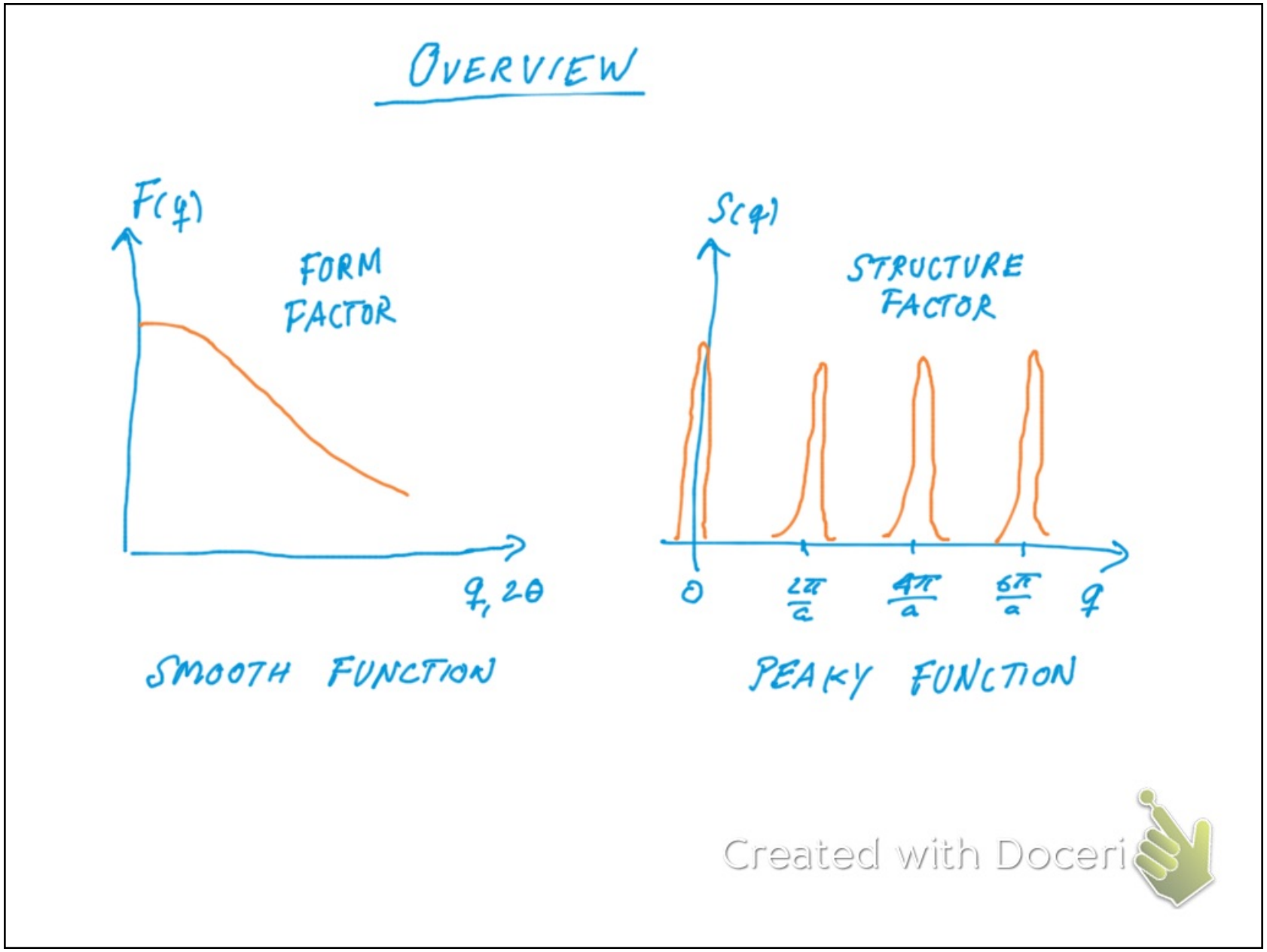
↙

WE EVALUATED

$\langle k_f | V(r) | k_i \rangle \rightarrow$ SOME INTEGRAL MANIPULATIONS $\rightarrow F(q)S(q)$

WHERE

$$S(q) = \sum_i e^{-i\bar{q}\bar{r}_i}$$


OVERVIEW
F(q)
FORM FACTOR
q, 2θ
SMOOTH FUNCTION
S(q)
STRUCTURE FACTOR
0
2π/a
4π/a
6π/a
q
PEAKY FUNCTION
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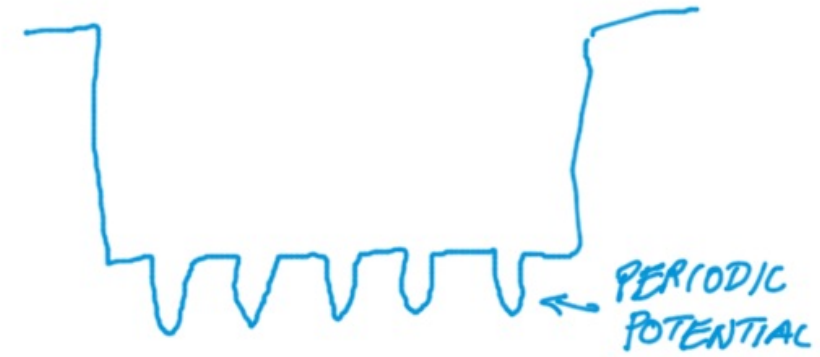
BRIEF OVERVIEW ON BAND-STRUCTURE:

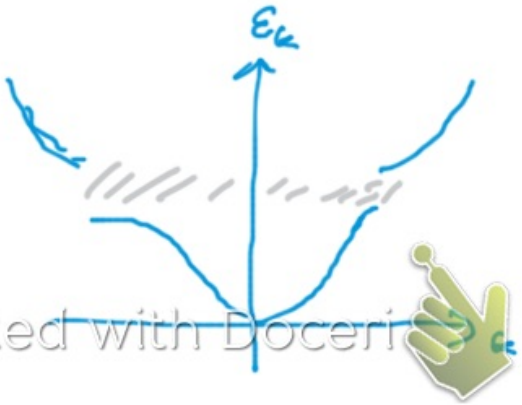


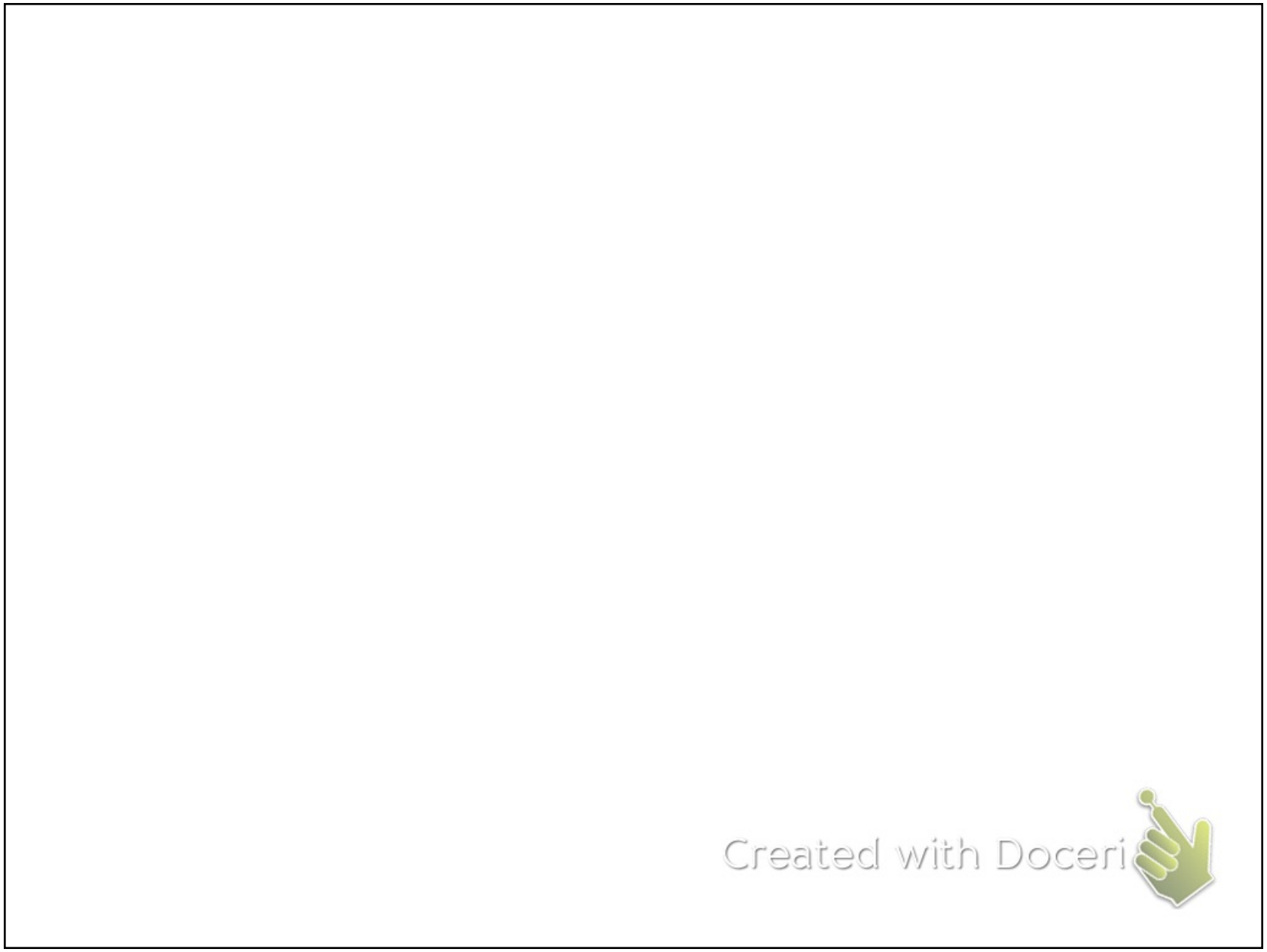
CONSEQUENCE I: BLOCH THEOREM

WAVE FUNCTION
ψ

CONSEQUENCE II: BAND GAP'S

EIGEN ENERGIES
ε_k

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