

## 5.12: Diffraction Pattern for Pentagonal Finite Point Scatterers

Establish mask geometry:

$$R = 2 \quad m = 1 \dots A \quad \Theta_m = \frac{2\pi m}{A} \quad x_m = R \sin(\Theta_m) \quad y_m = R \cos(\Theta_m)$$

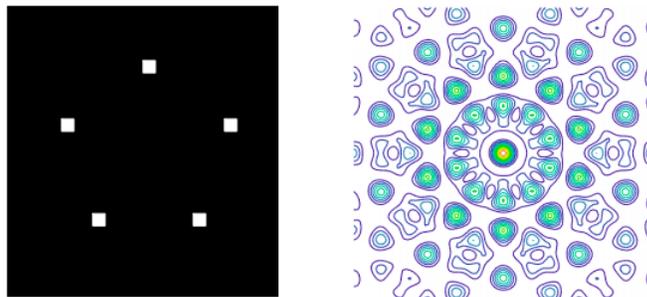
Fourier transform of position wave function (mask geometry) into the momentum representation:

$$\Phi(p_x, p_y) = \frac{1}{2\pi d\sqrt{A}} \left[ \sum_{m=1}^A \left( \int_{x_m - \frac{d}{2}}^{x_m + \frac{d}{2}} \exp(-ip_x x) dx \int_{y_m - \frac{d}{2}}^{y_m + \frac{d}{2}} \exp(-ip_y y) dy \right) \right]$$

Display mask geometry and diffraction pattern:  $A = 5 \quad d = .3$

$$N = 100 \quad \Delta p = 10 \quad j = 0 \dots N \quad k = 0 \dots N \quad px_j = -\Delta + \frac{2\Delta pj}{N} \quad py_k = -\Delta p + \frac{2\Delta pk}{N}$$

$$\text{Diffraction pattern}_{j,k} = (|\Phi(px_j, py_k)|)^2$$



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