

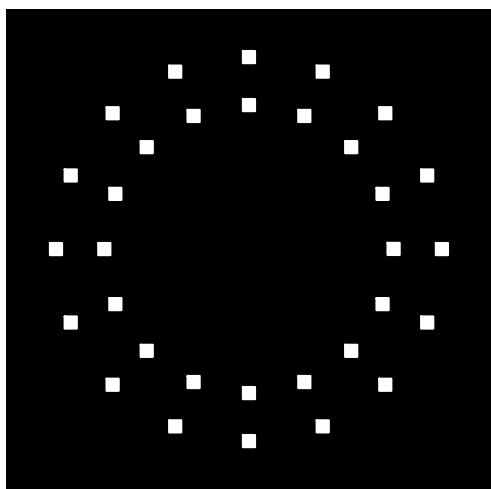
Diffraction Patterns for Two-dimensional Masks

Create hole positions:

$$A := 32 \quad R := 1.2 \quad m := 1..16 \quad \Theta_m := \frac{2 \cdot \pi \cdot m}{16} \quad x_m := R \cdot \sin(\Theta_m) \quad y_m := R \cdot \cos(\Theta_m)$$

$$R := .9 \quad m := 17..A \quad \Theta_m := \frac{2 \cdot \pi \cdot m}{16} \quad x_m := R \cdot \sin(\Theta_m) \quad y_m := R \cdot \cos(\Theta_m)$$

Display coordinate-space wave function (mask geometry): $m := 1..A$



Fourier transform position wave function into the momentum representation:

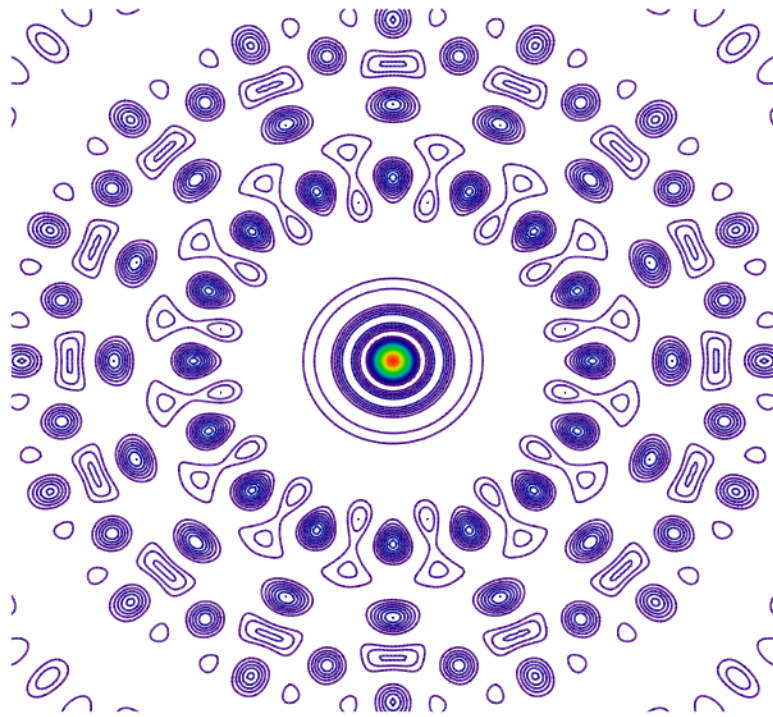
$$\Delta := 30 \quad N := 200 \quad j := 0..N \quad p_{x_j} := -\Delta + \frac{2 \cdot \Delta \cdot j}{N} \quad k := 0..N \quad p_{y_k} := -\Delta + \frac{2 \cdot \Delta \cdot k}{N}$$

Hole dimension: $d := .1$

$$\Psi(p_x, p_y) := \frac{1}{2 \cdot \pi \cdot d \cdot \sqrt{A}} \cdot \sum_{m=1}^A \left(\int_{x_m - \frac{d}{2}}^{x_m + \frac{d}{2}} \exp(-i \cdot p_x \cdot x) dx \cdot \int_{y_m - \frac{d}{2}}^{y_m + \frac{d}{2}} \exp(-i \cdot p_y \cdot y) dy \right)$$

Display diffraction pattern:

$$P_{j,k} := \left(\left| \Psi(p_{x_j}, p_{y_k}) \right| \right)^2$$



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