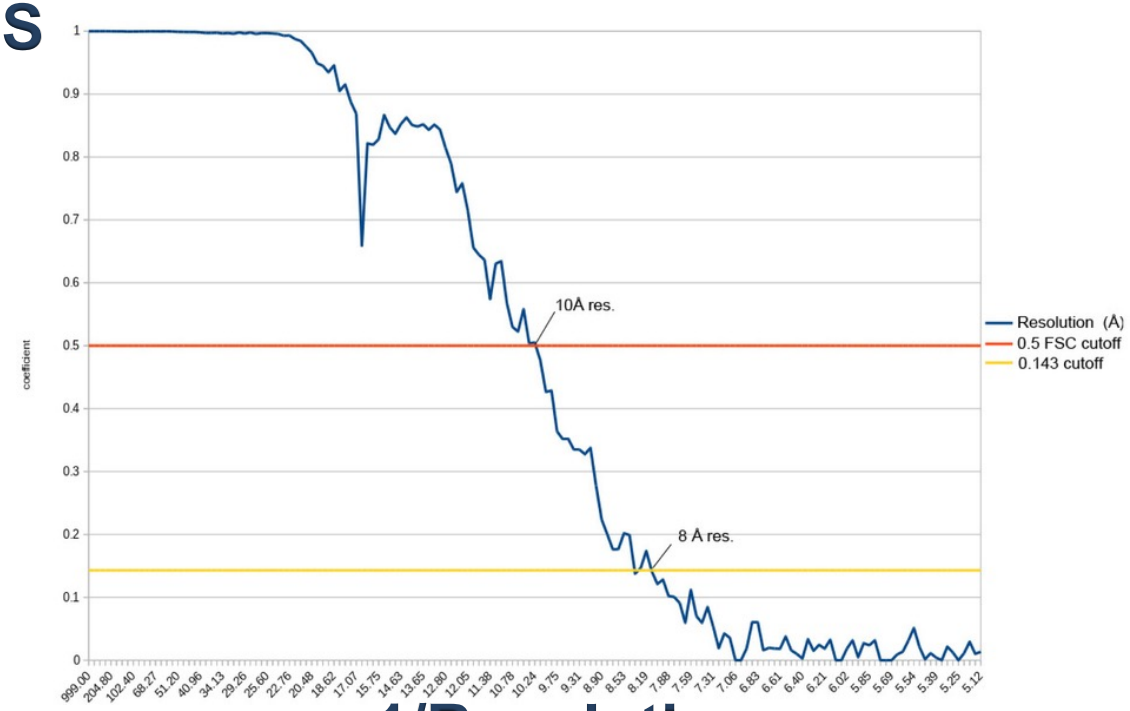
d_{FSC}

- Resolution in cryo-EM, d_{FSC}
  - Derived from Fourier Shell Correlation (FCS) between half-maps

FCS

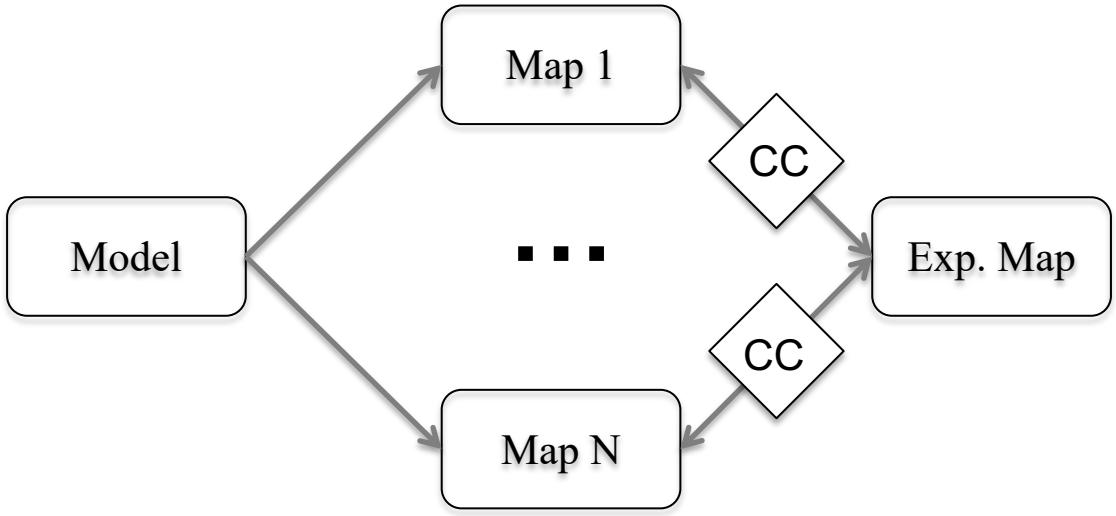


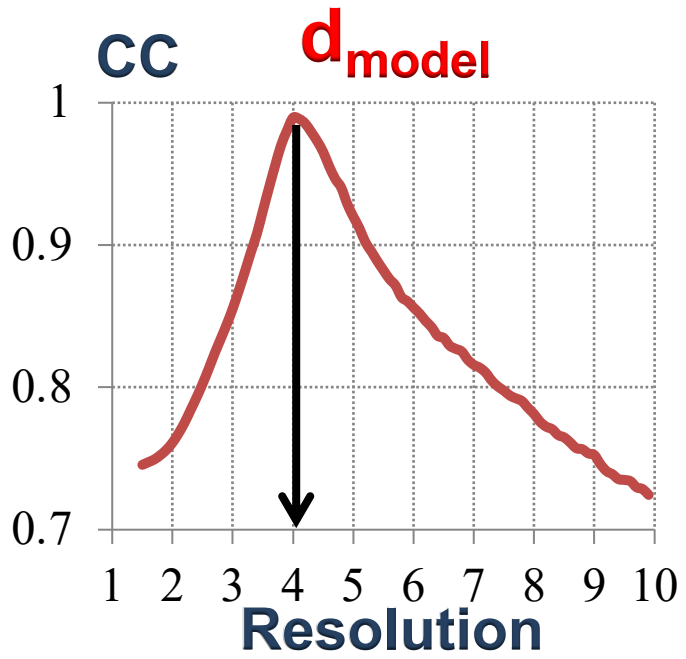
1/Resolution

Resolution from FSC does not necessarily describe map details but rather signal vs noise

d_{model}

- **Procedure:**
  - **Compute many model-calculated maps at different resolutions**
  - **Compare each map with experimental map using CC**
  - **Choose resolution that maximizes CC**

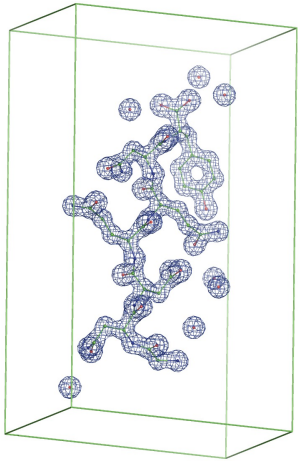


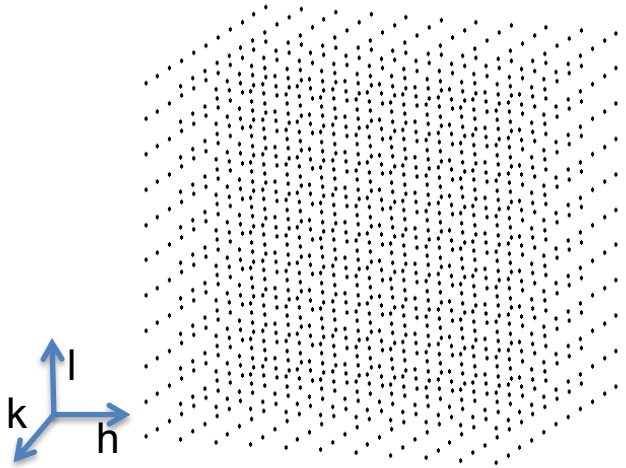


- **Requires a model**
- **May depend on model quality (in reality dependence is weak)**

d_{99}

- **Map in real space (*ρ*)**
- **Map in Fourier space (*F*)**



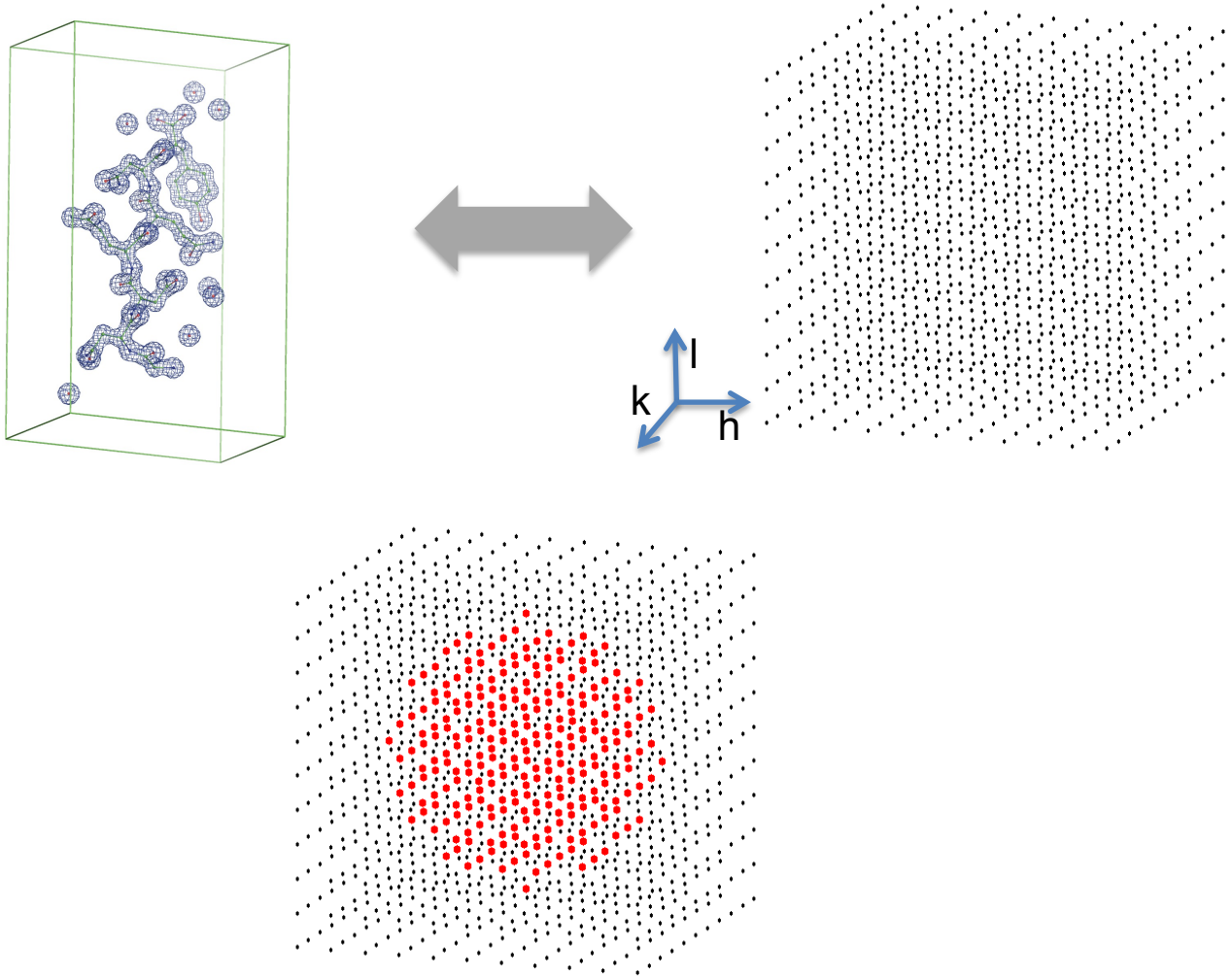


- **Relationship between *ρ* and *F***

$$F(\mathbf{s}) = \int_{V_{cell}} \rho(\mathbf{r}) \exp(2\pi i \mathbf{sr}) dV \quad \Longleftrightarrow \quad \rho(\mathbf{r}) = \frac{1}{V_{cell}} \sum_{h} \sum_{k} \sum_{l} F(\mathbf{s}) \exp(-2\pi i \mathbf{sr})$$

d_{99}

- Crystallography

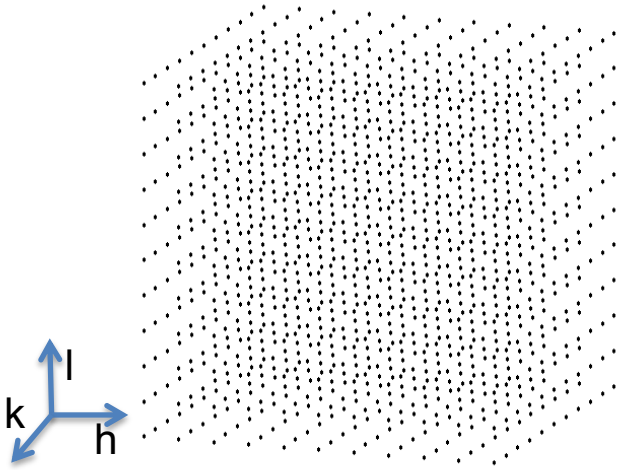


Reflections in sphere $R=1/d_{min}$

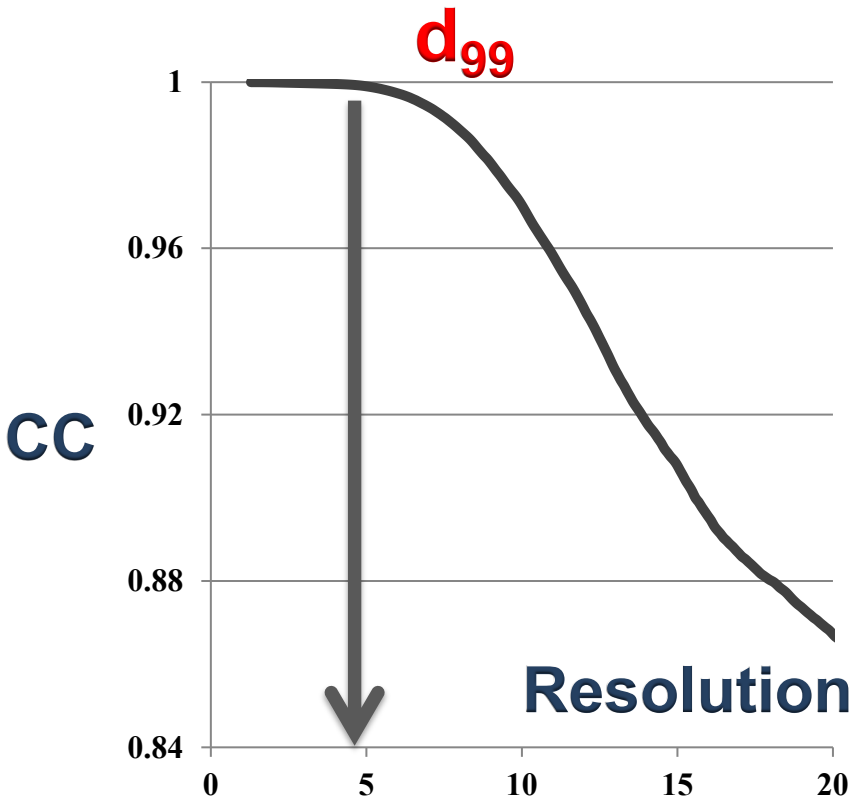
d_{min} - highest resolution

d_{99}

- **Protocol:**
  - **Remove chunks of highest resolution coefficients**
  - **Compute map using remaining coefficients**
  - **Compute CC between original map and new map**



Resolution once CC drops 0.99



$$CC(\rho_{init},\rho_{cut}) = \left(\sum_{Sbox} F_{map}^2(\mathbf{s})\right)^{-1/2} \left(\sum_{Scut} F_{map}^2(\mathbf{s})\right)^{1/2}$$