



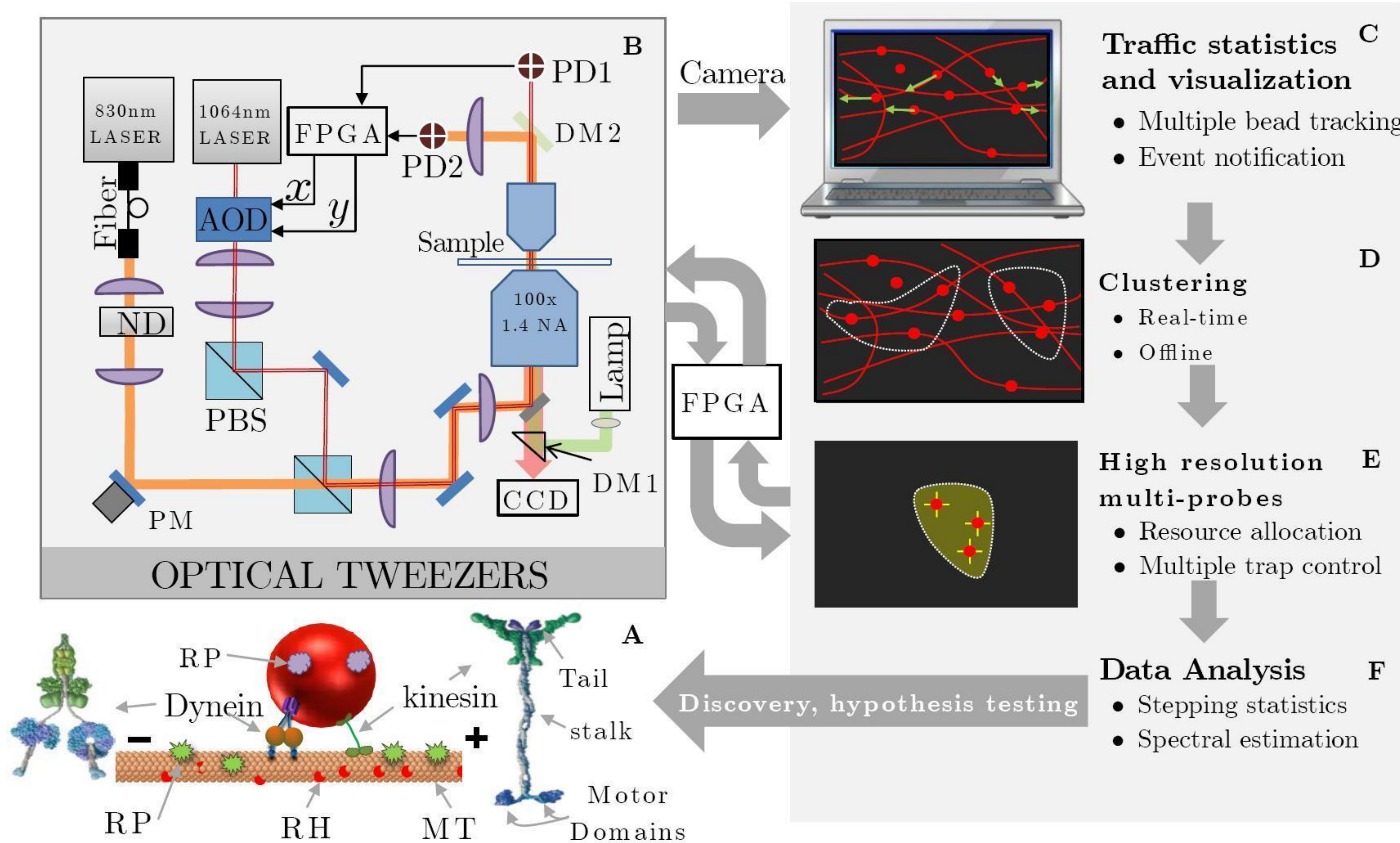
Learning From Cells For Transport At Micron Scale

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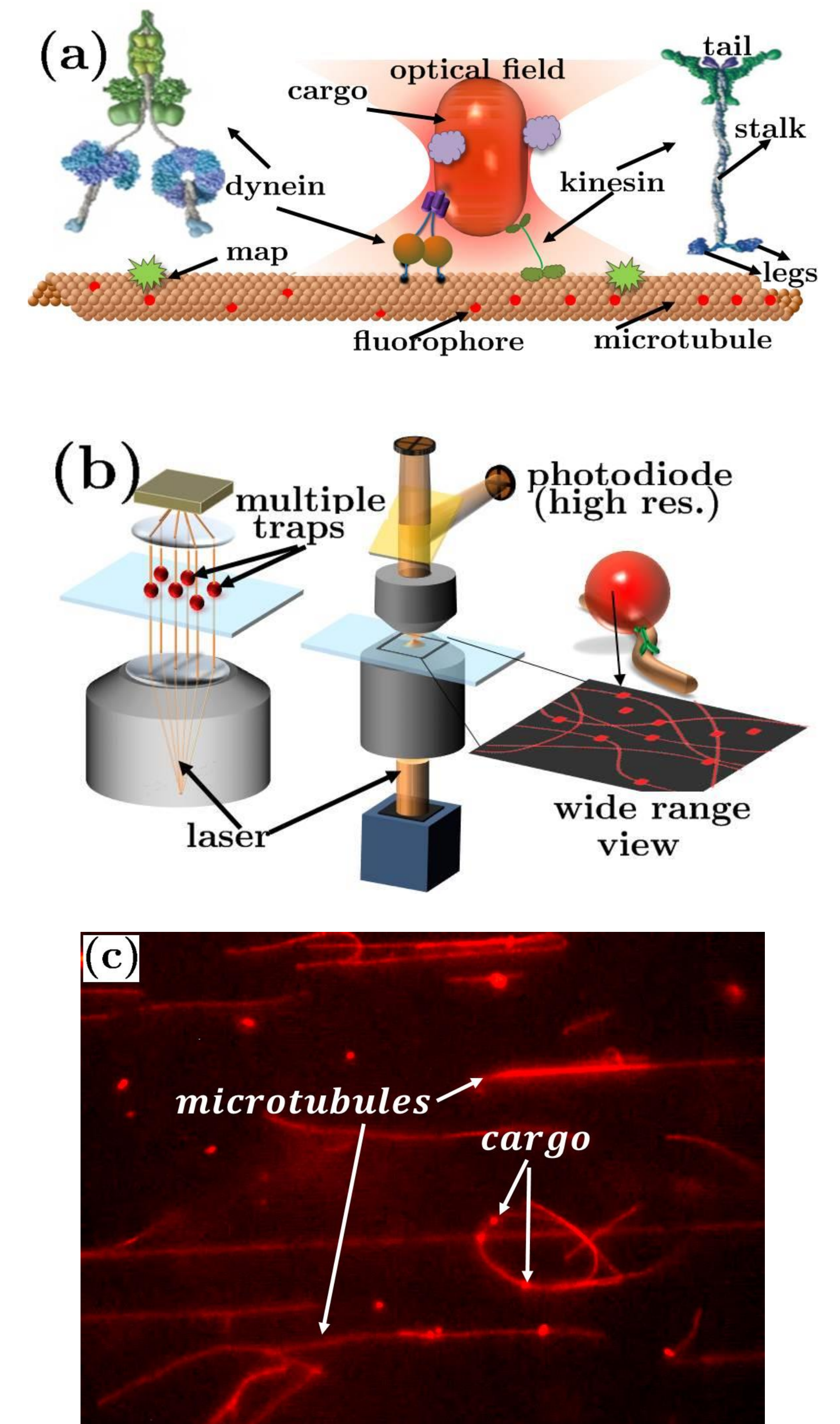
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Overview

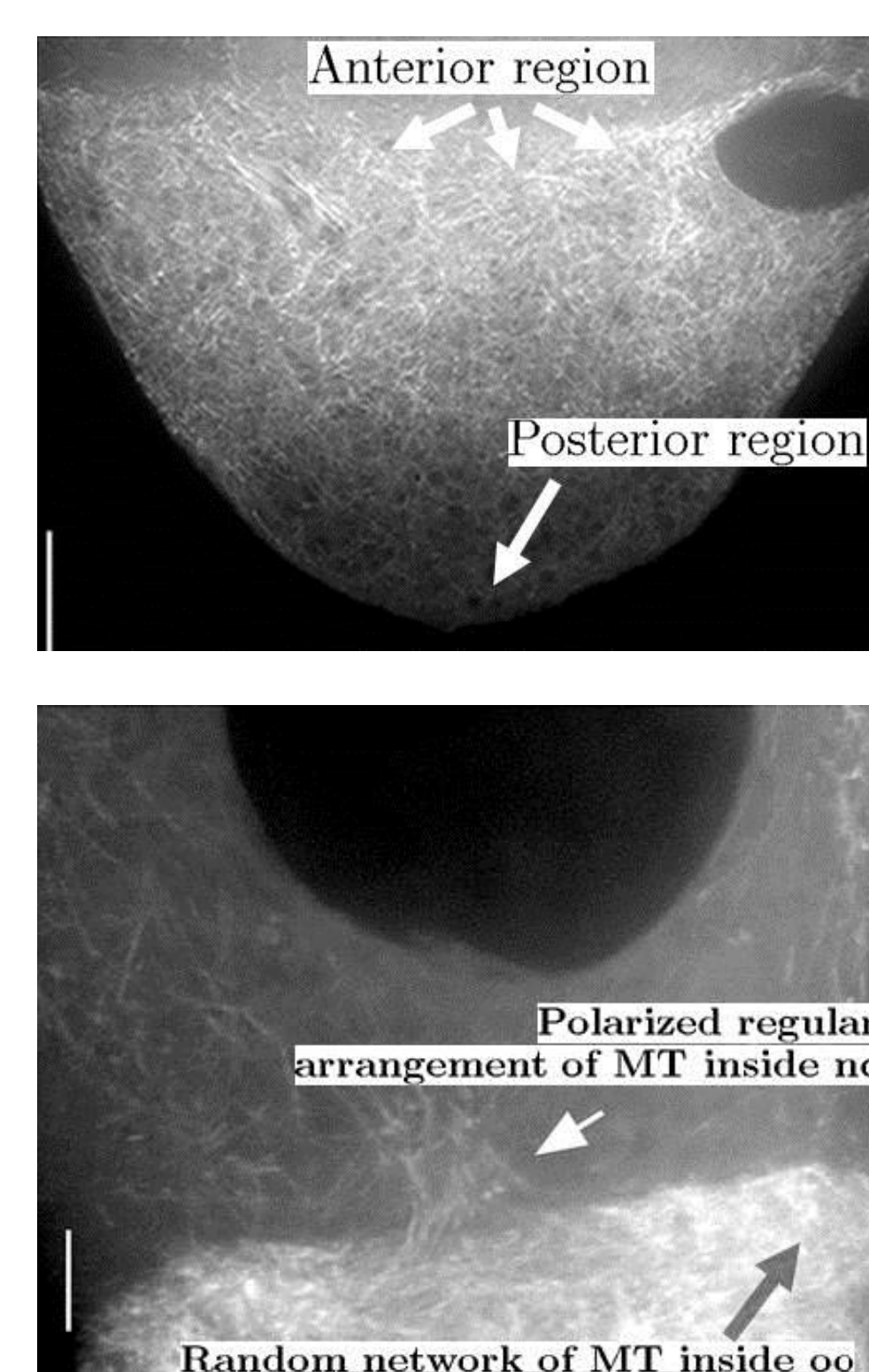


Transport Constructs



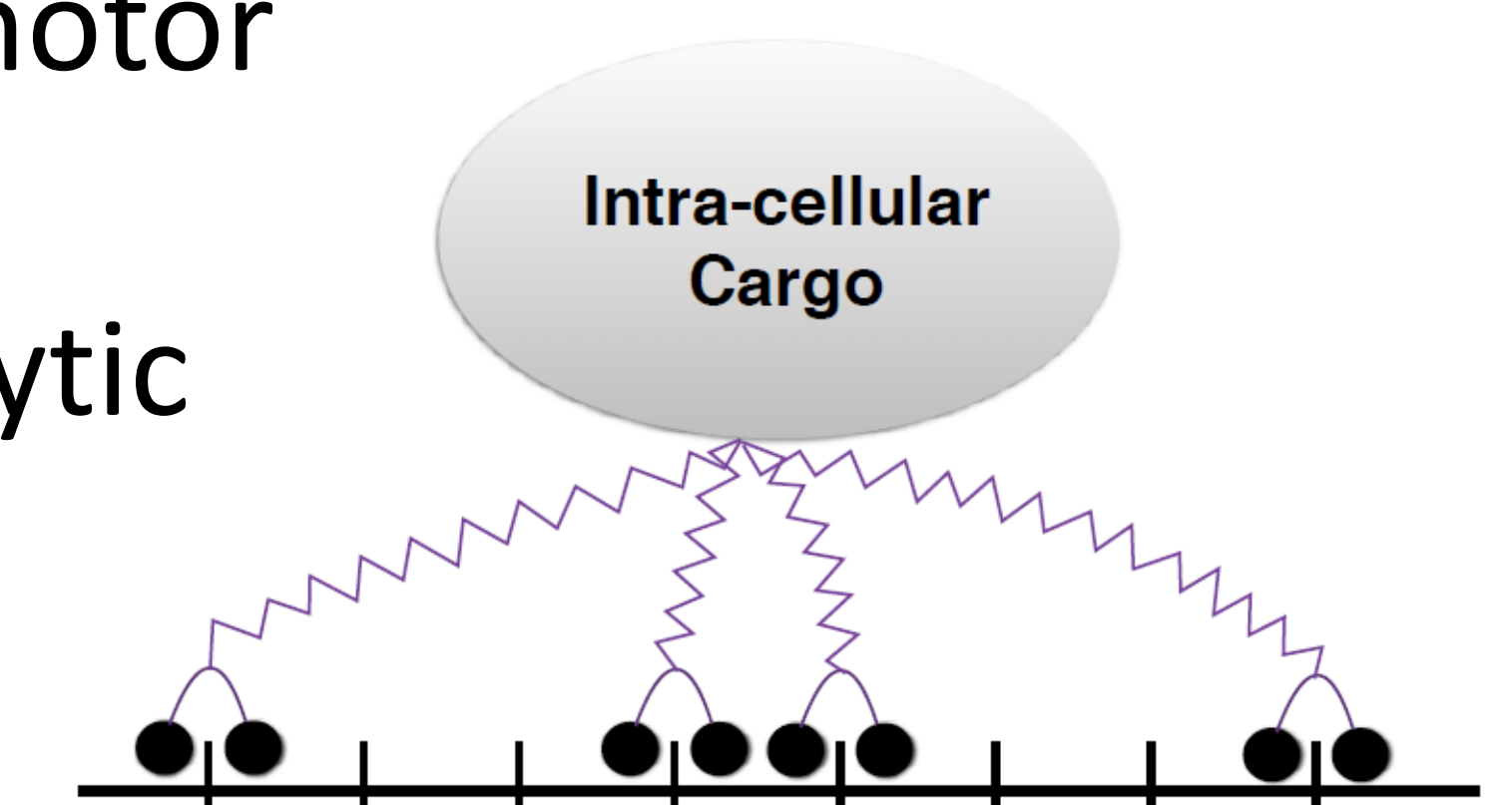
Exclusive directed transport over random networks with bias

- Directed Transport of material over unorganized network of microtubules
- Investigate if repeated track switching enables exclusive transport over random networks with small bias
 - Examine kinesin and dynein behaviors
 - Non-specific motor modification to achieve transport to destination

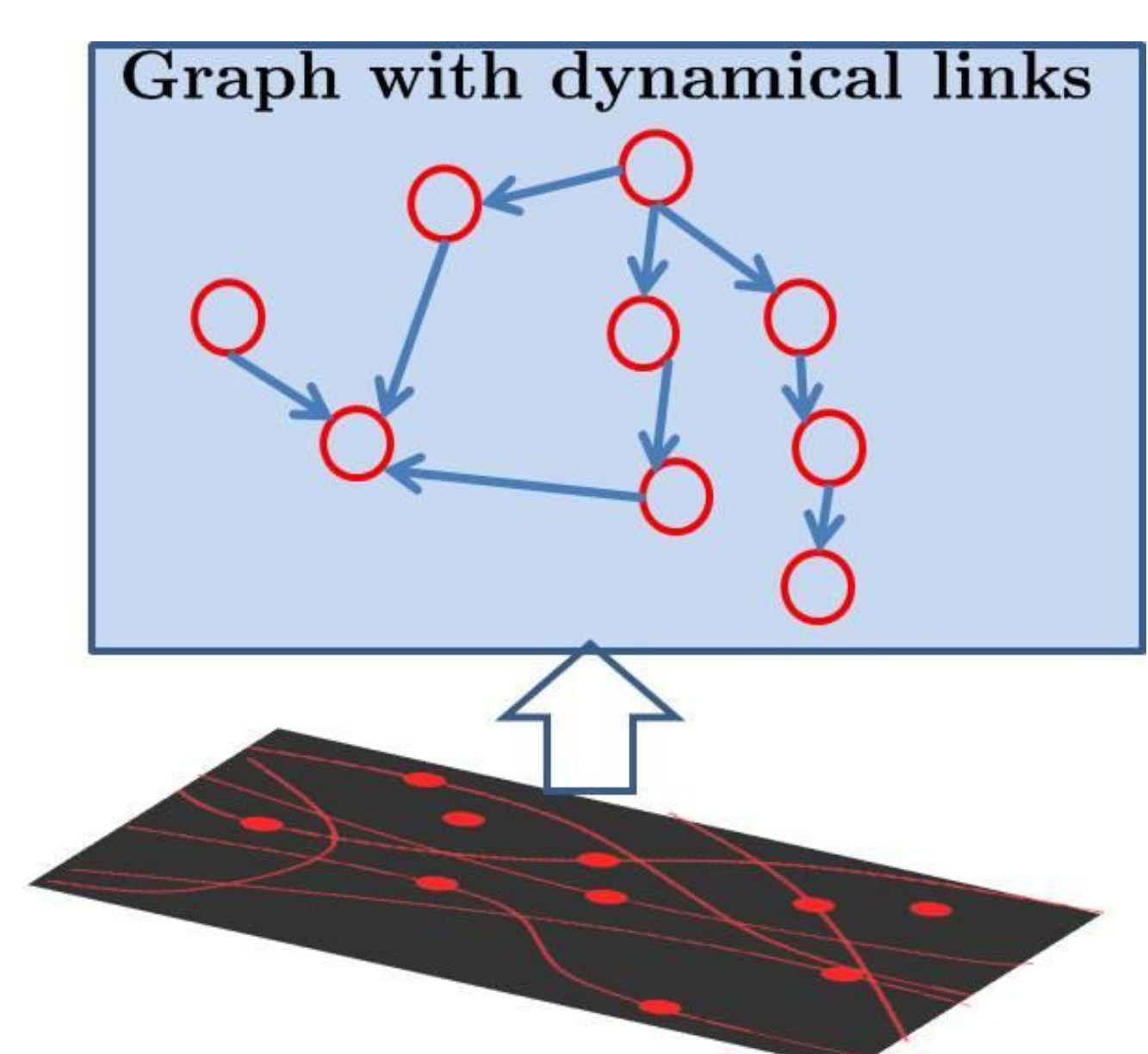


How multiple motors coordinate transport

- Multiple-motor based transport characteristics using single-motor models
- A general purpose semi-analytic simulation engine
 - Obtaining biologically relevant quantities such as run-length and velocity



Inference and control engine



- Control and travelling salesman problem
 - High resolution sensing and manipulation resources are scarce
 - Optimal allocation needed
- Influence diagrams/causation from time series data
 - Use of graphical models

SUMMARY

- Transport at microscale targeted using bio-constructs
- Cyber-physical platform comprised of manipulation and sensing using optical fields
- Cyber-physical principles :
 - Control with resource allocation constraints
 - Co-ordination mechanisms for transport by multiple agents
- Enabling discovery of intra-cellular transport mechanisms