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Physical mechanism of the nuclear pore transport. A. ZILMAN, S. DI TALIA, M. MAGNASCO, M. ROUT, B. CHAIT, Rockefeller University — Functioning of eukaryotic cells depends on precise regulation of the transport of proteins in and out of the nucleus. All the transport in an out of the nucleus proceeds through the nuclear pore complex (NPC). NPC is an efficient transport device, which transports proteins between the nucleus and the cytoplasm in milliseconds time. NPC is highly selective, only allowing efficient passage of the molecules bound to the transporter proteins. Although, one GTP is used per transported cargo, the process of translocation through the pore is passive and does not involve active energy consumption. The key component in the NPC function is the attractive interaction between the transporter proteins, and the flexible filaments, lining the internal surface of the pore. We model the transport through the NPC as diffusion in an effective potential due to attachments to the flexible filaments. Using analytical theory and computer simulations, we explain known functional features of the NPC, in terms of its basic physical properties.

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