

## סמינר בביומכניקה - Biomechanics Seminar

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד' 8.05.13 (כ"ח באייר, תשע"ג), בשעה 13:30 בחדר 641 בבניין לידי דייויס.

ירצה :

**Nadiv Dharan**

*Department of Biomedical Engineering  
Ben-Gurion University of the Negev  
Be'er Sheva, Israel*

על הנושא:

## Duty ratio of cooperative molecular motors

להלן תקציר ההרצאה:

Motor proteins are specialized molecules that convert chemical energy into useful mechanical work and govern many important biological processes. They bind to actin filaments and microtubules and use them as tracks, on which they propagate in order to transport different types of cargo across the cell. Among these molecules we find myosin II motors that interact with elastic actin filaments. Myosin II motors are non processive with a low duty ratio, which means that in order to work effectively they need to cooperate with each other. The collective work of myosin II motors on elastic actin tracks suggests that these filaments may be subjected to significant tensile stresses. It has been found that the stress applied on the actin may induce an indirect crosstalk between the motors in order to diminish the elastic energy, which is expressed by changes in their binding / unbinding statistics. This type of indirect communication between motors via the elastic track, which has been termed the elasticity mediated crosstalk (EMC) effect, may significantly affect the motors' effective processivity. By using a statistical mechanical analysis and Monte Carlo computer simulations, we explore the magnitude and role of the EMC effect in two types of systems where the collective action of myosin II motors on actin filament is present: (i) gliding motility assays and (ii) muscle contraction. In motility assays, we find that the EMC effect has a small impact on the collective action of motors. In muscle contraction, however, we find that the EMC effect can lead to significant variations in the duty ratio between motors, which may have a serious negative influence on the ability of the motors to perform effectively. Nevertheless, this feature becomes significant only in systems larger than the sarcomere (which is the basic contractile unit of the muscle cell). The EMC effect may, thus, serve as an explanation for the specific dimensions of the sarcomere, which are found to be essentially identical across different vertebrate species.

בברכה,

המארח : פרופ' מ/ספי גבלי

פרופ' נח צבי טרינבלט  
מרכז הסמינרים