Ruđer Bošković Institute

# COLLOQUIUM

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**III WING LECTURE HALL**
**RUĐER BOŠKOVIĆ INSTITUTE**

# FINDING THE MIDDLE GROUND: MECHANISMS OF CHROMOSOME BIORIENTATION IN HUMAN MITOSIS


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Equal segregation of chromosomes into the two daughter cells during cell division is enacted by the 'spindle', a macromolecular machine that self-assembles from hundreds of microtubules. For proper segregation, sister chromatids containing duplicated DNA molecules within each chromosome must physically connect with the opposite poles of the spindle, which makes the chromosome 'bioriented' - simultaneously attached to both spindle poles. Molecular mechanisms that govern biorientation determine the fidelity of chromosome segregation. In my talk, I will review the behavior of chromosomes during mitotic spindle assembly in human cells, whether chromosome biorientation is achieved via sequential vs. simultaneous attachments of sister chromatids to spindle, discuss the roles of various molecular motors, and various classes of microtubules in this process. I will specifically focus on the hypothesis that rapid and efficient chromosome biorientation is achieved via highly dynamic interactions between short microtubules locally produced at chromosomes and longer bundled microtubules within the spindle proper.


**DR. ALEXEY KHODJAKOV**

Dr. Alexey Khodjakov, a Senior Investigator at the Wadsworth Center, New York State Department of Health, received his M.S. (1985) and Ph.D. (1990) degrees from the Lomonosov Moscow State University in Russia. In 1990, he joined Dr. Ryoko Kuriyama's laboratory at the University of Minnesota Medical school as a postdoctoral researcher studying the centrosome. His second postdoctoral training was with Dr. Conly Rieder, working on the spindle assembly checkpoint and the role of kinetochores in the control of mitotic progression. In 1999, Dr. Khodjakov started his independent career in 1999 as a Research Scientist at the Wadsworth Center. Among his contributions to Cell Biology are the demonstration of centrosome dispensability for cell division, the discovery of centrosome de novo assembly in somatic cells, and characterization of chromosome behaviors during mitotic spindle assembly. Dr. Khodjakov has contributed to the development of several sophisticated approaches for studying the cell cycle and mitosis. In 1998, he pioneered the use of laser microablation on intracellular targets delineated by the expression of fluorescent proteins. His laboratory is renowned for the extensive use of correlative Light/Electron microscopy. In this approach, high-resolution reconstructions are obtained for the same organelle whose behavior was followed in a live cell, yielding unique insights into the structural foundation of the organelle's functions. Dr. Khodjakov is on several editorial boards, including the Journal of Cell Biology and Cell motility. He has served on numerous grant review panels and organizing committees of international meetings in Cell Biology.