

Venue:

Spanish National Cancer Research Centre – CNIO Auditorium, Madrid, Spain

Organizing committee:

Óscar Llorca, CNIO, Structural Biology Programme, Madrid, Spain

Rafael Fernández Leiro, CNIO, Structural Biology Programme, Madrid, Spain

Eva Nogales, University of California, Berkeley, US

Machines acting on DNA and RNA, a molecular mechanistic perspective

Rationale:

Cells have evolved complex macromolecular machines capable of dealing with the challenges involved in the manipulation of nucleic acids during DNA replication, DNA repair, RNA processing, transcription, translation, and other DNA and RNA transactions. The combination of advances in cryo-electron microscopy with cell and molecular biology, biochemistry and biophysics is providing unprecedented advances in our understanding of these complex and highly regulated processes. This meeting will bring together research leaders in the field with a focus on the integration of structural, biophysical and biochemical studies to define the molecular mechanisms underlying the function of the large molecular machines carrying out nuclei acid transactions essential for the cell and the organism.

SPEAKER LIST

Dr. Alexey Amunts, University of Münster, Germany

Dr. James Berger, Johns Hopkins School of Medicine, US

Dr. Gina Buchel, Yale University, US

Dr. Elena Conti, Max Planck – Biophysical Chemistry, Germany

Dr. Alessandro Costa, The Francis Crick Institute, UK

Dr. Israel S. Fernández, Biophysics in the Basque Country (CSIC-UPV/EHU), Spain

Dr. Yuan He, Johns Hopkins University, US

Dr. Siddhant Jain, Harvard Medical School, US

Dr. Elizabeth Kellogg, St. Jude Children’s Research Hospital, US

Dr. Meindert Lamers, Leiden University Medical Center (LUMC), The Netherlands

Dr. Jun-Jie Liu, Tsinghua University, China

Dr. Nicole Hoitsma, University of Colorado Boulder, US

Dr. Kelly Nguyen, MRC Laboratory of Molecular Biology (LMB), UK

Dr. Lori Passmore, MRC Laboratory of Molecular Biology (LMB), UK

Dr. Christian M. T. Spahn, Institute of Medical Physics and Biophysics, Germany

Dr. Alessandro Vannini, Human Technopole, Italy

Dr. Wei Yang, National Institutes of Health (NIH), US

Dr. Xiaodong Zhang, Imperial College London, UK

Wednesday May 28th, 2025

08:30-09:15 Registration - main hall

09:15-09:30 *Welcome address*

09:30-12:30 Session 1. Chromatin structure and remodelling

09:30 – 10:00 Visualisation of telomeric complexes by cryoEM
Kelly Nguyen, MRC Laboratory of Molecular Biology (LMB), UK

10:00 – 10:30 Unraveling SMARCAD1 as a multifaceted chromatin remodeler
Nicole Hoitsma, University of Colorado Boulder, US

10:30-11:00 Poster session - coffee break – social room

11:00 – 11:15 *short talk*

11:15 – 11:30 *short talk*

11:30 – 12:00 Structure and Function of Mammalian SWI/SNF Chromatin Remodeling Complexes in Health and Disease
Siddhant Jain, Harvard Medical School, US

12:00 – 12:30 Transcriptional and extra-transcriptional roles of the RNA Polymerase III machinery in genome function and organisation
Alessandro Vannini, Human Technopole, Italy

12:30-14:00 Lunch break – Canteen

14:00-15:30 Session 2. DNA damage signalling and repair

14:00 – 14:30 Deciphering the Molecular Blueprint of NHEJ-Mediated DNA Repair
Yuan He, Johns Hopkins University, US

14:30 – 15:00 How Poxviruses target NHEJ proteins
Óscar Llorca, Spanish National Cancer Research Centre-CNIO, Spain

15:00 – 15:15 *short talk*

15:15 – 15:30 *short talk*

15:30 – 16:00 Choreographed molecular dynamics in repairing DNA
Wei Yang, National Institutes of Health-NIH, US

16:00-16:30 Poster session - coffee break – social room

16:30-17:45 Session 3. Genome Editing

16:30 – 17:00 Understanding and engineering programmable transposons for genome-editing
Elisabeth Kellogg, St. Jude Children’s Research Hospital, US

17:00 – 17:15 *short talk*

17:15 – 17:45 RNA-Associated Machines for Gene Editing
Jun-Jie Liu, Tsinghua University, China

17:45-19:00 Poster session – refreshments for all participants – social room

Thursday May 29th, 2025

09:30-12:15 Session 4. Macromolecular complexes in DNA / RNA processing

09:30 – 10:00 Molecular Machines that sense and respond to viral RNA: the RIG-I like family
Gina Buchel, Yale University, US

10:00 – 10:15 *short talk*

10:15 – 10:45 Understanding specificity in mRNA decay
Lori Passmore, MRC Laboratory of Molecular Biology (LMB), UK

10:45-11:30 Group picture CNIO main entrance / poster session & coffee break – social room

11:30 – 12:00 The RNA exosome complex at the crossroads of RNA processing and decay
Elena Conti, Max Planck – Biophysical Chemistry, Germany

12:00 – 12:15 *short talk*

12:15-17:45 Session 5a. Replication and Transcription

12:15 – 12:45 What does DNA Polymerase gamma do? Understanding the mitochondrial DNA replication machinery
Rafael Fernández-Leiro, Spanish National Cancer Research Centre-CNIO, Spain

12:45 – 13:00 *short talk*

13:00-14:30 Lunch break – Canteen

14:30 – 15:00 Structures and molecular mechanisms of RAD51 modulators
Xiaodong Zhang, Imperial College London, UK

15:00 – 15:15 *short talk*

15:15 – 15:45 Surprises in the modularity of large transcriptional cofactors
Eva Nogales, University of California, Berkeley, US

15:45 – 16:00 *short talk*

16:00-16:30 Poster session - coffee break – social room

16:30 – 17:00 Activation of a eukaryotic origin of replication visualised by cryo-EM

Alessandro Costa, The Francis Crick Institute, UK

17:00 – 17:15 *short talk*

17:15 – 17:45 Structural and biophysical mechanisms of DNA replication

James Berger, Johns Hopkins School of Medicine, US

17:45-19:00 Poster session – refreshments for all participants – social room

Friday, May 30th, 2025

09:30-10:30 Session 5b. Replication and Transcription

09:30 – 10:00 Targeting bacterial DNA polymerases for the next generation of antibiotics

Meindert Lamers, Leiden University Medical Center-LUMC, The Netherlands

10:00 – 10:15 *short talk*

10:15 – 10:30 *short talk*

10:30-12:30 Session 6. Translation

10:30 – 11:00 Cryo-electron microscopy of actively translating ribosomes

Christian M. T. Spahn, Institute of Medical Physics and Biophysics, Germany

11:00-11:30 Poster session - coffee break – social room

11:30 – 12:00 A cryo-EM view of RNA-based control of translation initiation

Israel S. Fernández, Biofisika Institute (CSIC-UPV/EHU), Spain

12:00 – 12:30 From RNA to Membrane: Mitochondrial Ribosomes at Work **EMBO Young Investigator Lecture**

Alexey Amunts, University of Münster, Germany

12:30 Poster/talk prizes

Wrap up and closing: Oscar Llorca, Eva Nogales and Rafael Fernandez Leiro