

Lectures on QCD for EIC

Report of Contributions

Contribution ID : 1

Type : **not specified**

Basics of Color Glass Condensate (1/2)

Monday, 25 April 2022 14:00 (60)

- 1) Structure of hadrons: DIS
- 2) DIS at small x : gluon saturation
 - a: High gluon density effects: classical multiple scatterings
Ex. 1: quark anti-quark production in DIS
Ex. 2: F_2 , F_L structure functions in DIS
 - b: Quantum loops: evolution equations
BK/JIMWLK eqs. for dipoles
- 3) Solutions of the BK eq.
Phenomenological applications
- 4) Current/Future directions

Link to the recording:

<https://cernbox.cern.ch/index.php/s/pD2QNVUjLZ9kz4C>

Please ask the organizers for the password.

Presenter(s) : JALILIAN-MARIAN, Jamal (Baruch College, CUNY, New York, USA)

Contribution ID : 3

Type : **not specified**

Introduction to physics of EIC (2/4)

Monday, 14 March 2022 14:00 (60)

In four lectures basic theoretical ideas underlying future studies at the EIC will be presented, including a historic perspective of the subject.

The tentative titles of the lectures are the following:

1. From Greeks to QCD
2. Partonic structure of nucleons
3. Parton saturation
4. Personal overview of EIC studies

The underlying theme is the QCD at action.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/PGEaJYuUT5kvLPw>

Please ask the organizers for the password.

Presenter(s) : GOLEC-BIERNAT , Krzysztof (Institute of Nuclear Physics PAN, Cracow, Poland)

Contribution ID : 4

Type : **not specified**

Introduction to physics of EIC (3/4)

Monday, 21 March 2022 14:00 (60)

In four lectures basic theoretical ideas underlying future studies at the EIC will be presented, including a historic perspective of the subject.

The tentative titles of the lectures are the following:

1. From Greeks to QCD
2. Partonic structure of nucleons
3. Parton saturation
4. Personal overview of EIC studies

The underlying theme is the QCD at action.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/nW4Eqss4CsfKIPd>

Please ask the organizers for the password.

Presenter(s) : GOLEC-BIERNAT , Krzysztof (Institute of Nuclear Physics PAN, Cracow, Poland)

Contribution ID : 5

Type : **not specified**

Introduction to physics of EIC (4/4)

Monday, 28 March 2022 14:00 (60)

In four lectures basic theoretical ideas underlying future studies at the EIC will be presented, including a historic perspective of the subject.

The tentative titles of the lectures are the following:

1. From Greeks to QCD
2. Partonic structure of nucleons
3. Parton saturation
4. Personal overview of EIC studies

The underlying theme is the QCD at action.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/8f4MMCKvFgXvYF6>

Please ask the organizers for the password.

Presenter(s) : GOLEC-BIERNAT , Krzysztof (Institute of Nuclear Physics PAN, Cracow, Poland)

Contribution ID : 6

Type : **not specified**

Factorisation for parton distributions and related quantities (1/2)

Monday, 4 April 2022 14:00 (60)

Abstract: I review some of the main concepts that allow us to separate process-dependent dynamics from properties of the proton in high-energy collisions. Topics covered are collinear factorisation, scale evolution, operator product expansion, factorisation for TMDs.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/7nbFvlllB2aNnV1>

Please ask the organizers for the password.

Presenter(s) : DIEHL, Markus (Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany)

Contribution ID : 7

Type : **not specified**

Factorisation for parton distributions and related quantities (2/2)

Monday, 11 April 2022 14:00 (60)

Abstract: I review some of the main concepts that allow us to separate process-dependent dynamics from properties of the proton in high-energy collisions. Topics covered are collinear factorisation, scale evolution, operator product expansion, factorisation for TMDs.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/hNLLn8g7Y8BCUvW>

Please ask the organizers for the password.

Presenter(s) : DIEHL, Markus (Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany)

Contribution ID : 8

Type : **not specified**

Introduction to physics of EIC (1/4)

Monday, 7 March 2022 14:00 (60)

In four lectures basic theoretical ideas underlying future studies at the EIC will be presented, including a historic perspective of the subject.

The tentative titles of the lectures are the following:

1. From Greeks to QCD
2. Partonic structure of nucleons
3. Parton saturation
4. Personal overview of EIC studies

The underlying theme is the QCD at action.

Presenter(s) : GOLEC-BIERNAT , Krzysztof (Institute of Nuclear Physics PAN, Cracow, Poland)

Contribution ID : 9

Type : **not specified**

Basics of Color Glass Condensate (2/2)

Monday, 9 May 2022 14:00 (60)

- 1) Structure of hadrons: DIS
- 2) DIS at small x : gluon saturation
 - a: High gluon density effects: classical multiple scatterings
Ex. 1: quark anti-quark production in DIS
Ex. 2: F_2 , F_L structure functions in DIS
 - b: Quantum loops: evolution equations
BK/JIMWLK eqs. for dipoles
- 3) Solutions of the BK eq.
Phenomenological applications
- 4) Current/Future directions

Link to the recording:

<https://cernbox.cern.ch/index.php/s/70N4ygN9dEhs59i>

Please ask the organizers for the password.

Presenter(s) : JALILIAN-MARIAN, Jamal (Baruch College, CUNY, New York, USA)

Contribution ID : 10

Type : **not specified**

Diffraction in hadronic collisions (1/2)

Monday, 16 May 2022 14:00 (60)

Diffractive events in hadronic collisions are classes of events characterized by the large interval of rapidity which is devoid of any hadronic activity. Such gaps are called large rapidity gaps, since they often span several units of rapidity. At HERA electron-proton collider, about 10% of events were classified as diffractive. In such events the proton either is scattered elastically or is dissociated into a state with the same quantum numbers, separated from the rest of hadronic activity. Diffraction is very interesting and important phenomenon, since its understanding may shed light into the confinement, low x parton evolution, including non-linear phenomena, and nuclear shadowing. In these lectures I will present basic introduction to diffraction phenomena, mainly in DIS, both from theoretical and phenomenological perspective and give the prospects for the measurements at the Electron Ion Collider.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/WmEYOJqGVQrrSi>

Please ask the organizers for the password.

Presenter(s) : STAŚTO , Anna (Penn State University, USA)

Contribution ID : 11

Type : **not specified**

Diffraction in hadronic collisions (2/2)

Monday, 23 May 2022 14:00 (60)

Diffraction events in hadronic collisions are classes of events characterized by the large interval of rapidity which is devoid of any hadronic activity. Such gaps are called large rapidity gaps, since they often span several units of rapidity. At HERA electron-proton collider, about 10% of events were classified as diffractive. In such events the proton either is scattered elastically or is dissociated into a state with the same quantum numbers, separated from the rest of hadronic activity. Diffraction is very interesting and important phenomenon, since its understanding may shed light into the confinement, low x parton evolution, including non-linear phenomena, and nuclear shadowing. In these lectures I will present basic introduction to diffraction phenomena, mainly in DIS, both from theoretical and phenomenological perspective and give the prospects for the measurements at the Electron Ion Collider.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/GY167SXGTQ1hUNg>

Please ask the organizers for the password.

Presenter(s) : STAŠTO, Anna (Penn State University, USA)

Contribution ID : 12

Type : **not specified**

The physics of the QCD energy-momentum tensor (1/2)

Monday, 30 May 2022 14:00 (60)

In QCD, the energy-momentum tensor has been recognized as a central object allowing one to address the questions of hadron mass, spin and pressure forces. These are key motivations for the physics case of the EIC project in the US. In these two lectures, we will discuss various interesting and non-trivial aspects of the QCD energy-momentum tensor that have recently attracted a lot of attention, like e.g. the questions of its definition, renormalization, decomposition into quark and gluon contributions, interpretation as spatial distributions, sum rules derived from Poincaré symmetry, and links with experimental observables.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/f19els9FtLJ8S6b>

Please ask the organizers for the password.

Presenter(s) : LORCÉ, Cédric (CPHT, École Polytechnique, Palaiseau, France)

Contribution ID : 13

Type : **not specified**

The physics of the QCD energy-momentum tensor (2/2)

Monday, 6 June 2022 14:00 (60)

In QCD, the energy-momentum tensor has been recognized as a central object allowing one to address the questions of hadron mass, spin and pressure forces. These are key motivations for the physics case of the EIC project in the US. In these two lectures, we will discuss various interesting and non-trivial aspects of the QCD energy-momentum tensor that have recently attracted a lot of attention, like e.g. the questions of its definition, renormalization, decomposition into quark and gluon contributions, interpretation as spatial distributions, sum rules derived from Poincaré symmetry, and links with experimental observables.

Link to the recording:

<https://cernbox.cern.ch/index.php/s/Lox76VfCYVbnmYC>

Please ask the organizers for the password.

Presenter(s) : LORCÉ , Cédric (CPHT, École polytechnique, Palaiseau, France)