

# METANANO SCHOOL 2020

## PARTICIPANT GUIDE

Dear participants, we look forward to seeing you at METANANO SCHOOL. To make sure everything runs smoothly we have prepared a guide for you.

### 1. SIGNING UP AND ACTIVATING YOUR ZOOM ACCOUNT

#### 1. Creating your own account

To sign up for your own free account, visit [zoom.us/signup](https://zoom.us/signup) and enter your email address. You will receive an email from Zoom (no-reply@zoom.us). In this email, click Activate Account.

#### 2. Signing in to your Zoom account on the web

You can login to your Zoom account on the web at any time, at [zoom.us/signin](https://zoom.us/signin) to the Zoom web portal.

#### 3. Downloading the Zoom client

We recommend you to download the Zoom Desktop Client (available for Mac, Windows, ChromeOS and Linux) or the Zoom Mobile App (available for iOS and Android).

Follow the link from our Downloads page - <https://zoom.us/download>, then launch Zoom and sign in to the Zoom desktop client.

The Zoom logo is displayed in a blue, lowercase, sans-serif font.A blue button with rounded corners containing the text "Join a Meeting" in white.A white button with rounded corners and a thin blue border containing the text "Sign In" in blue.

#### 4. Starting a test meeting

You can join a test Zoom meeting to familiarize yourself with the Zoom and test your microphone/speakers, visit [zoom.us/test](https://zoom.us/test) and click Join.

## ONLINE STREAMING AND APPLICATION

For the lectures we will use the online streaming platform and the app to ensure good sound and video quality.

The practical classes will be held in Zoom so you can interact with the lecturer.

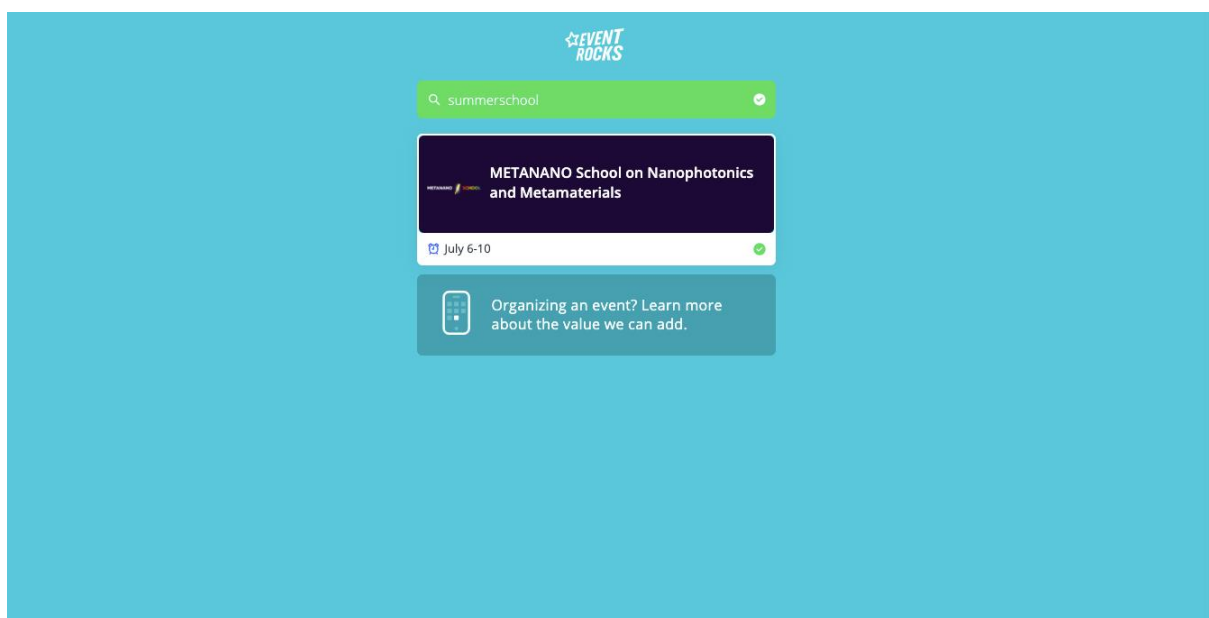
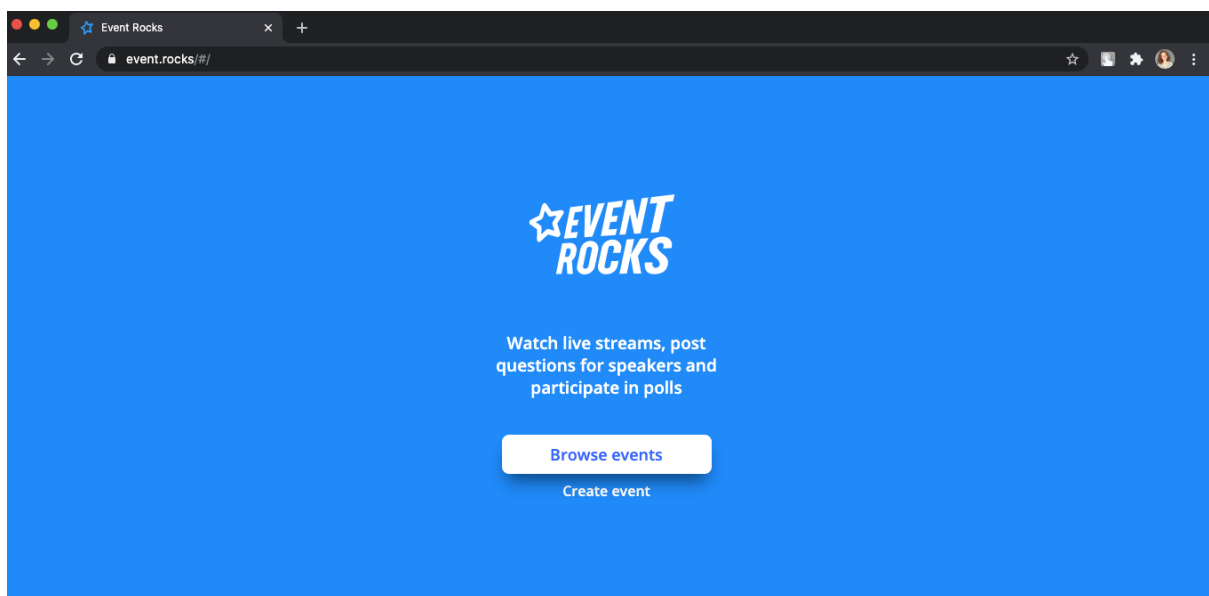
You can watch the lecture either in the app or in your browser with online streaming platform.

### ONLINE STREAMING PLATFORM (FOR DESKTOP AND LAPTOPS):

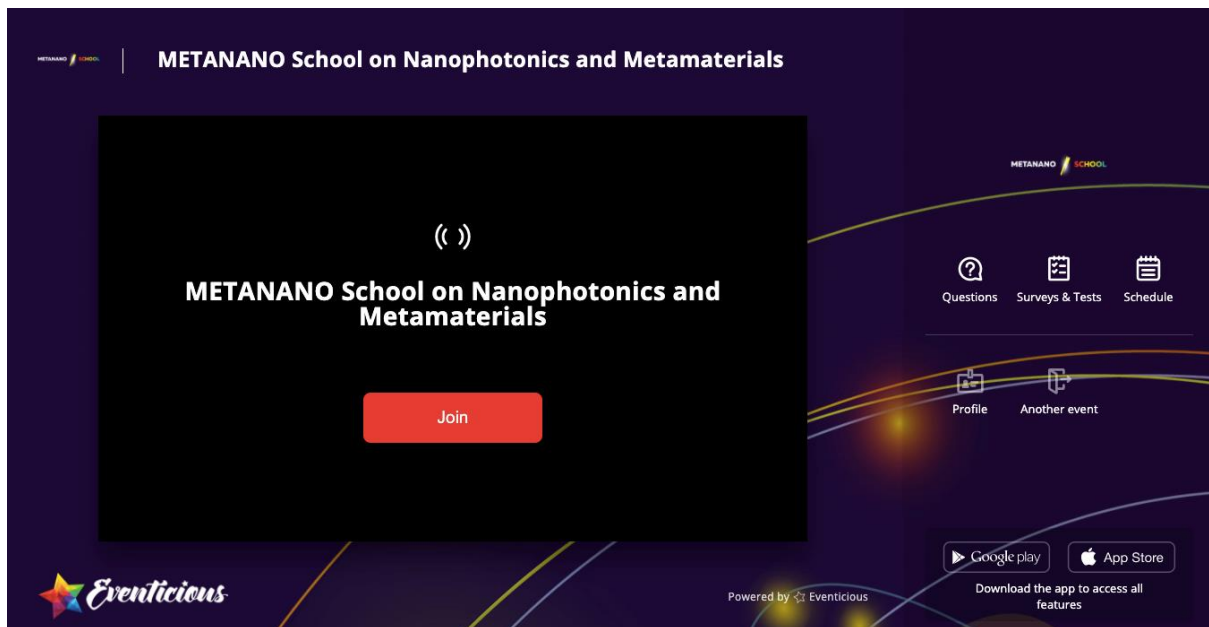
To watch the lecture in your browser from your laptop follow the link -

<https://event.rocks/>

press the "Browse events" button and enter the event ID summerschool and press on the METANANO School on Nanophotonics and Metamaterials

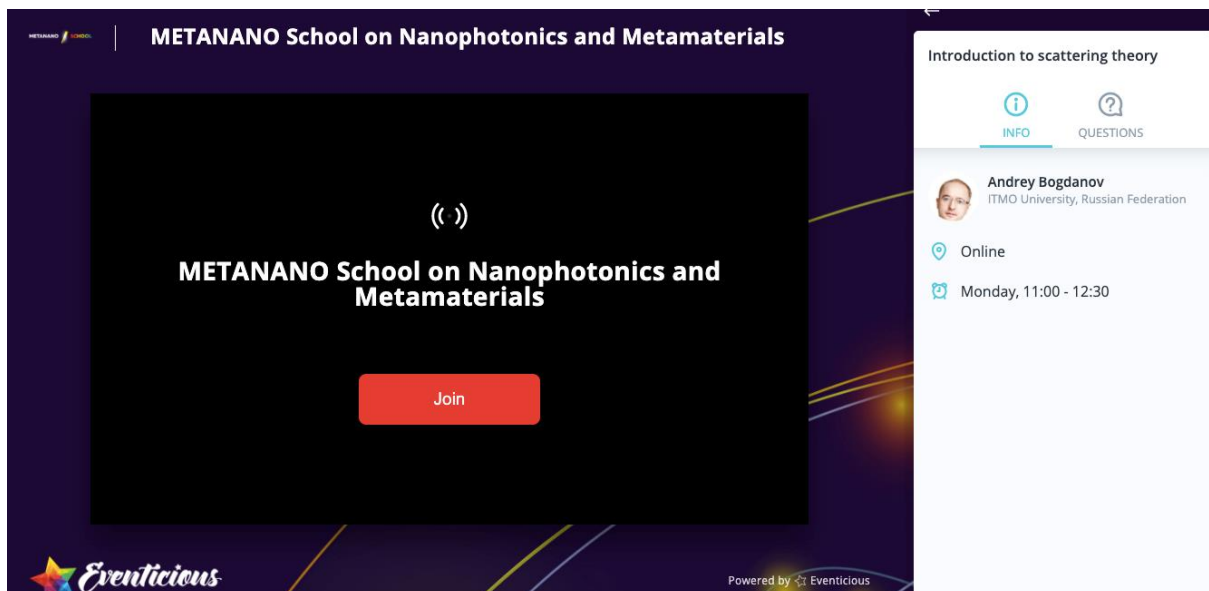


You will see the page with the Video Stream, Schedule, Questions and Surveys buttons.



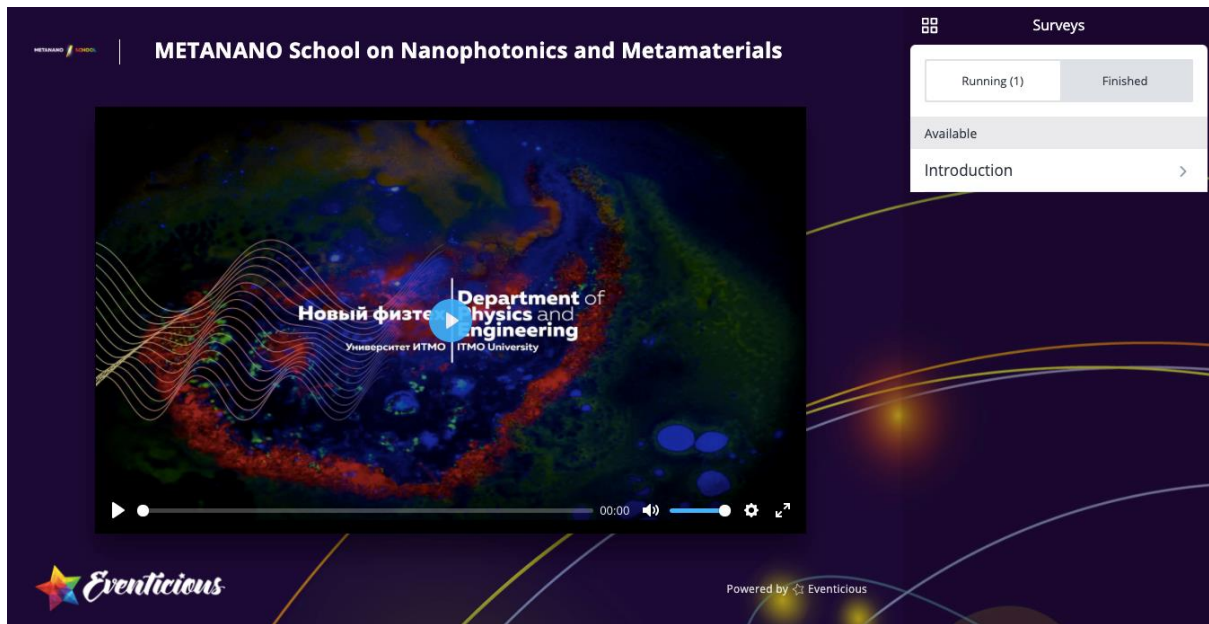
You can ask general questions via the "Questions" button (it becomes available once the broadcast is live).

If you have scientific questions to the lecturer during the lecture, you need to open the "Schedule" (menu on the right), find the lecture you have a question about and tap on "Questions". The lecturer will see your question and give a response. There is also an option to answer question using the app, the instructions are given below.



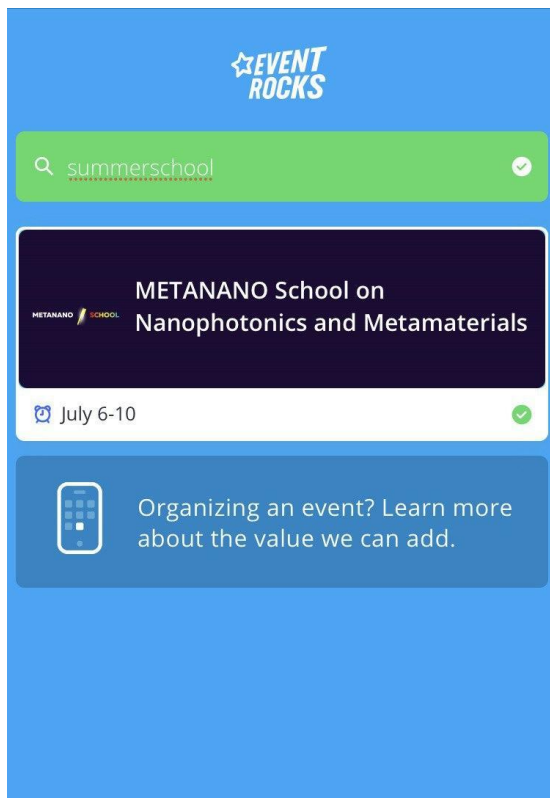
Lecturers may ask you to answer a simple question via the Survey to check how you follow the content.

When you are asked to answer the Survey, please go to the "Surveys and Tests" button and click on the survey. There is also an option to answer survey using the app, the instructions are given below.



#### APP:

We will send you the link with your personal ID to the email address you've put upon registration to the school (the email will be sent from METANANO School (noreply@mail.eventicious.com)). You'll need to download the app, enter the event ID **summerschool** and press on the METANANO School on Nanophotonics and Metamaterials.

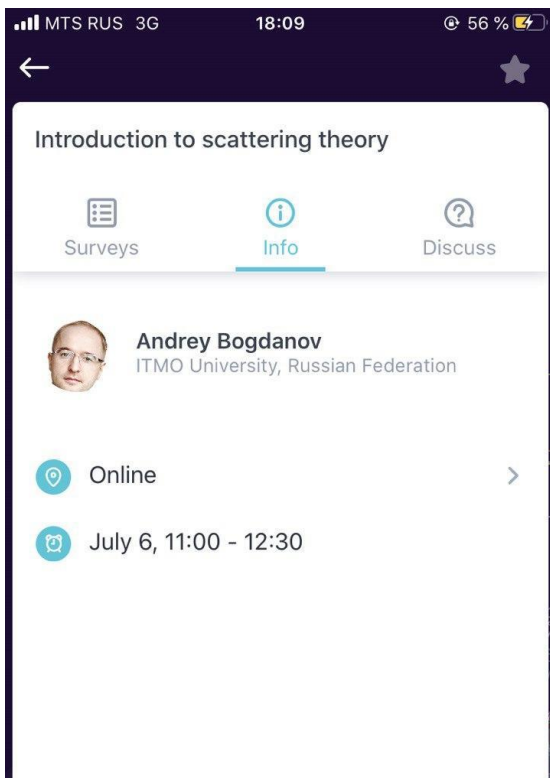


You can communicate with each other, ask questions, answer surveys and watch the lectures via the app.

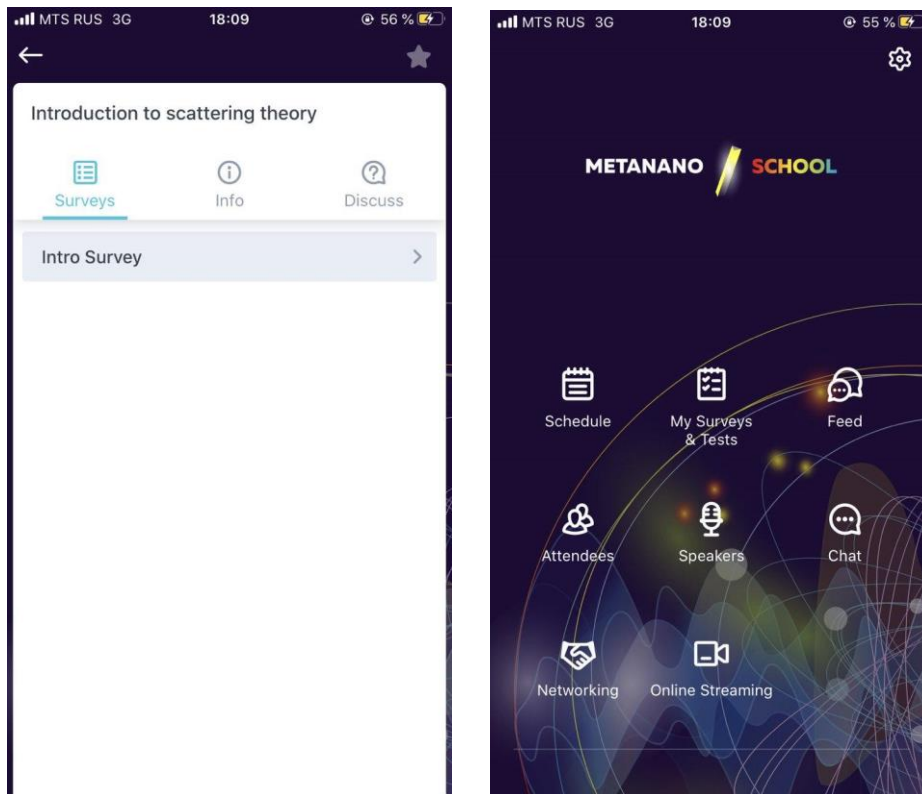
The online stream is available via "Online streaming" button.



In the app you can send the questions to the lecturer by clicking on the "Schedule", find the lecture you have a question about, tap on "Questions" and send your question.



If the lecturers ask you to answer a question via the Survey in the app you can do it either by clicking on the Survey tab inside the lecture (left picture) or by clicking on the "My Surveys & Tests".



You can chat with each other via "Chat" option by selecting a person from the list of all attendees.

The information from organizers will be in the "Feed" – important updates, reminders and so on.

And please turn on the Push-Notifications in the app settings to receive timely updates.

## PRACTICAL CLASSES

For METANANO SCHOOL practices we will use a [Zoom Meeting setup](#). Please be polite, don't interrupt teacher, to ask rise our hand and wait when, you will be allowed to speak.

To join the School practical classes you need to register [via the link](#) (we recommend to register in advance). Check the School Program on the website at the [Program Section](#).

After filling in the form you will receive a confirmation email, where you will find the link to join.

With this link you will be able to connect to the School practices during all days.

Hi Anna Dyma,

Thank you for registering for "METANANO SCHOOL Practice".

Please submit any questions to: [summerschool@physics.itmo.ru](mailto:summerschool@physics.itmo.ru)

Date Time: Jul 7, 2020 03:50 PM Moscow

Jul 7, 2020 03:50 PM

Jul 8, 2020 11:00 AM

Jul 9, 2020 12:50 PM

Jul 10, 2020 12:50 PM

Please download and import the following iCalendar (.ics) files to your calendar system.

Daily: [https://zoom.us/meeting/attendee/tJ0scuCppzlrH92ueUKu927gBw3lQHd9V2rz/ics?user\\_id=1voJ-liHTIWOC9NumEn8fQ](https://zoom.us/meeting/attendee/tJ0scuCppzlrH92ueUKu927gBw3lQHd9V2rz/ics?user_id=1voJ-liHTIWOC9NumEn8fQ)

Join from PC, Mac, Linux, iOS or Android: [Click Here to Join](#)

Password: 308547

Note: This link should not be shared with others; it is unique to you.

[Add to Calendar](#) [Add to Google Calendar](#) [Add to Yahoo Calendar](#)

To get an asset to programs follow the instruction on the remote connection.

\*will be sent later

## MANUALLY JOINING

1. Locate the 9-digit meeting ID/webinar ID from your registration email. It will appear at the end of the phone dial-in information.
2. Sign in to the Zoom Desktop Client or Mobile App.
3. Click or tap Join a Meeting.
4. Enter the 9-digit webinar ID, Password and click Join.

## INTERACTIVE POSTER SESSION

On Monday and Thursday from 17.40 to 19.10 we will hold a Poster session.

The best posters will be rewarded!

For the poster session each presenter will need to join the individual Zoom conference (preliminary program [via the link](#), we will add the links before the Session). All participants will be able to connect, listen to the poster presentation and ask questions.

## RECOMMENDATIONS FOR PRESENTERS

We ask you to connect 10 minutes before the start of the Poster session.

Organizers will give you the privileges of co-host, participants will join and leave your conference during the allocated time.

NB! The duration of the Poster session is 1 hour 30 minutes, it is possible you will get disconnected after 40 minutes, please reconnect using the same link.

We don't have a template for the poster presentation, you are free to choose the format yourself. We recommend preparing 4 slides with visual materials and make them on one page.

**DeepTrack: A comprehensive deep learning framework for digital microscopy**

Benjamin Midtvedt<sup>1,2</sup>, Saga Helgadóttir<sup>1</sup>, Aykut Argun<sup>1</sup>, Daniel Midtvedt<sup>1</sup>, and Giovanni Volpe<sup>1</sup>

<sup>1</sup>Department of Physics, University of Gothenburg, SE-41296 Gothenburg, Sweden  
<sup>2</sup>Department of Physics, Chalmers University of Technology, SE-41296 Gothenburg, Sweden

**Abbreviated abstract:** DeepTrack is a deep-learning framework targeting optical microscopy. Firstly, it is packaged with an easy-to-use graphical user interface, solving standard microscopy problems with no required programming experience. Secondly, it provides a comprehensive programming API for creating representative synthetic data, using physical simulations of customizable optical systems, designed to exactly suit the problem. Thirdly, many standard deep learning methods are packaged with DeepTrack, including architectures such as U-NET, and regularization techniques such as augmentations. Finally, the framework is fully modular and easily extendable to implement new methods, providing both longevity and a centralized foundation to deploy new deep-learning solutions. To demonstrate the versatility of the framework, we show a few typical use-cases, including cell-counting in dense biological samples, extracting 3-dimensional tracks from 2-dimensional videos, and distinguishing and tracking microorganisms in bright-field videos.

Related publications: S. Helgadóttir et al., <https://doi.org/10.1364/OPTICA.6.000506>

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**Previous work, challenge, and approach**

In 1910, Jean Baptiste Perrin experimentally verified Einstein's prediction of particles' mean displacement by projecting the image of particles onto a sheet of paper and manually marking their positions over time.

Luckily, we are no longer required to track particles manually. Today, we use cameras to digitally record processes as seen through a microscope, which can later be automatically analysed using computer algorithms.

However, algorithmic methods still require a set of assumptions to be met and parameters to be tuned. We present DeepTrack 2.0, a comprehensive framework based on neural networks for the recognition of objects of all kinds in various environments.

J. B. Perrin, *Annales de Chimie et de Physique*, 1910

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**Techniques and Methods**

DeepTrack 2.0 is a comprehensive framework for creating synthetic training data using physical simulations of optical devices, training neural networks and analysing experimental data.

The package can be accessed at several levels of abstraction depending on the user's requirements and skills, from accessible code to a graphical user interface.

U-NET

Many examples of DeepTrack use U-net architecture as a base

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**Results and Conclusions**

**Good illumination** vs **Poor illumination**

DeepTrack tracks optically trapped particles in unstable conditions

DeepTrack extracts 3D tracks of holographic nanoparticles

	Red blood cells	Erythrocytes	Schistosoma	Ring	Lactobacilli	Glomerulocytes
Red blood cells	0.99	0.01	0.00	0.00	0.00	0.00
Erythrocytes	0.01	0.99	0.00	0.00	0.00	0.00
Schistosoma	0.00	0.00	0.99	0.01	0.00	0.00
Ring	0.00	0.00	0.01	0.99	0.00	0.00
Lactobacilli	0.00	0.00	0.00	0.00	0.99	0.01
Glomerulocytes	0.00	0.00	0.00	0.00	0.01	0.99

DeepTrack classifies cells in a blood smear

DeepTrack counts fluorescent cells

DeepTrack tracks quantum dots

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## CONTACT INFORMATION

If you are experiencing technical problems - you can't register, you haven't received the link, you can't install Zoom, you don't have sound or anything else, please contact the Organizers via the following channels:

Email: [summerschool@physics.itmo.ru](mailto:summerschool@physics.itmo.ru)

METANANO SCHOOL Telegram chat: to join the chat please [follow the link](#).

Telegram or WhatsApp of the Organizing Committee:


Anastasia Kaptsova: +7 911 142 76 30

Anna Dyma: +7 952 393 95 01

We hope you will have a useful and pleasant experience at METANANO SCHOOL 2020!  
Look forward to seeing you on Monday!

The School on Monday, July 6th **will start at 10.50** (Moscow time, +3GMT)

Check the School Program on the website at the [Program Section](#).

**BE in LOV**   
**with physics**