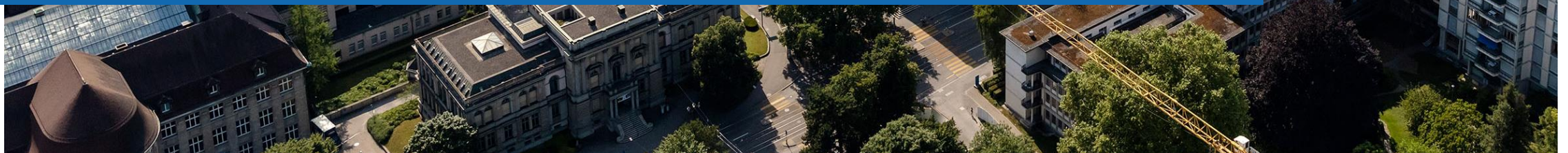




Knee deep in kinematics: unique approaches for understanding joint motion *in vivo*

Dr. Pascal Schütz

Laboratory for Movement Biomechanics



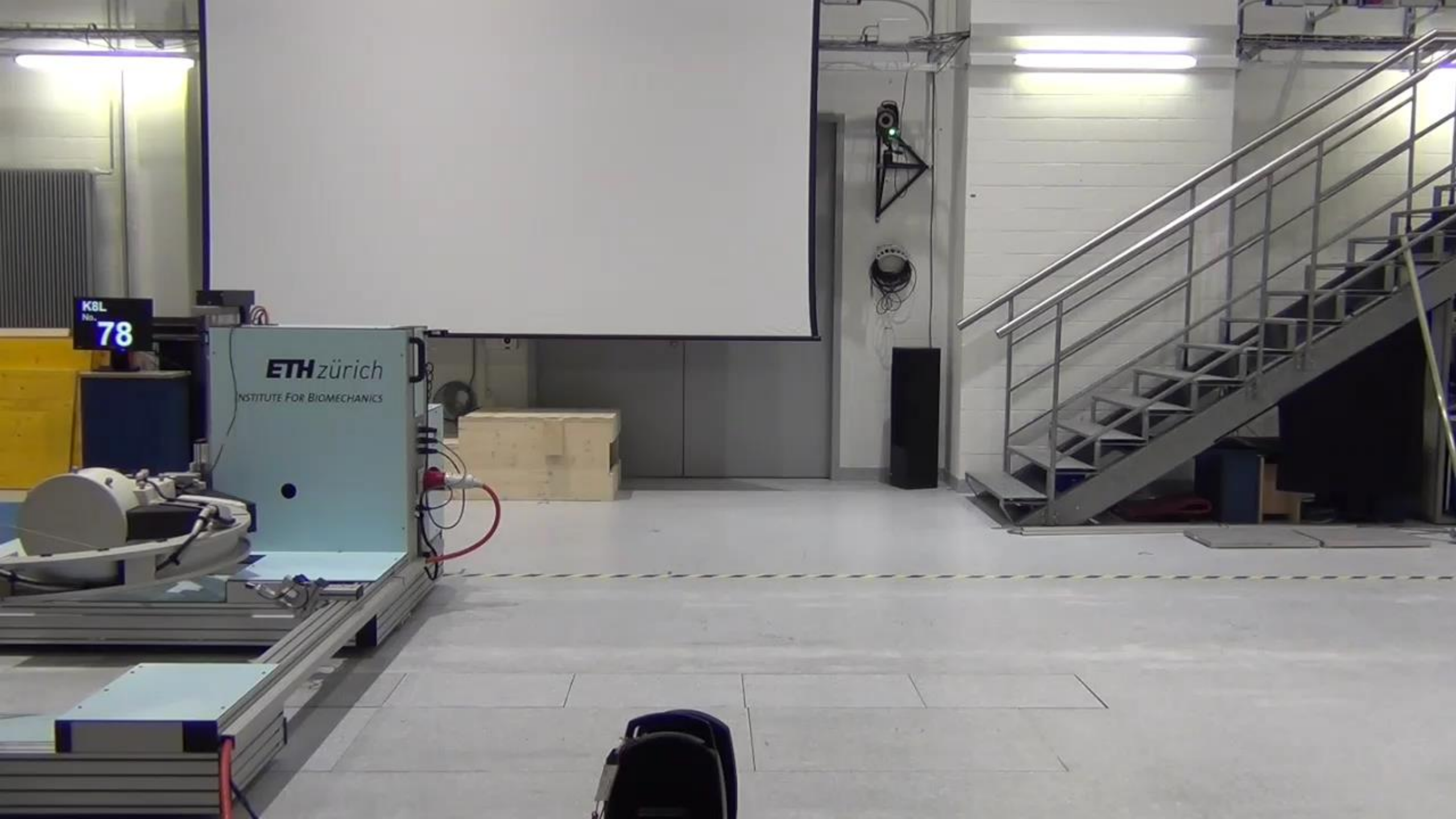
Loss of functionality is one of the most debilitating factors in patient wellbeing after total joint replacement



52% of the patients who had total knee arthroplasties reported some degree of **limitation in performing functional activities**

KBL
No. 78

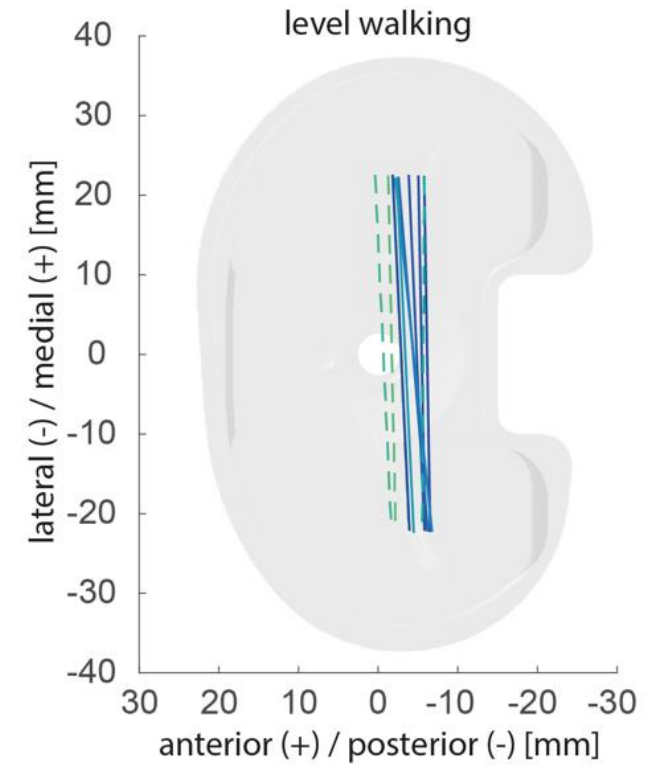
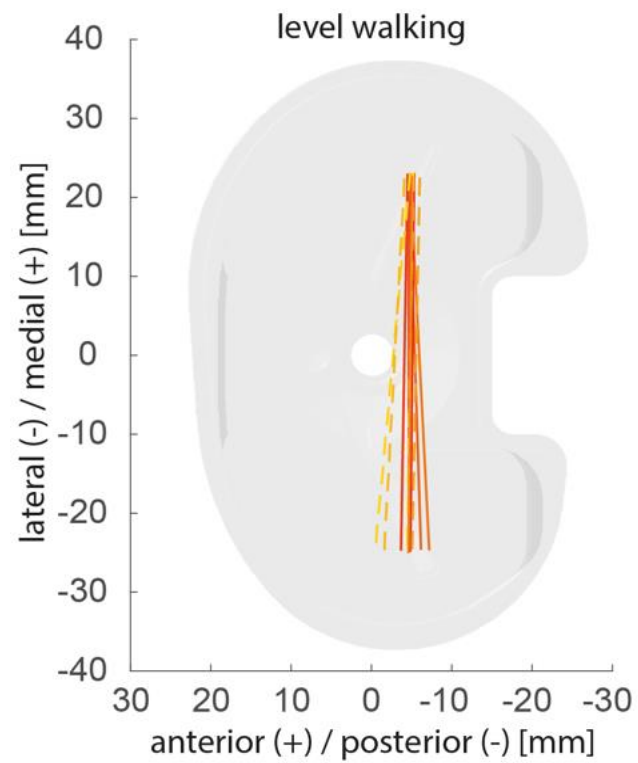
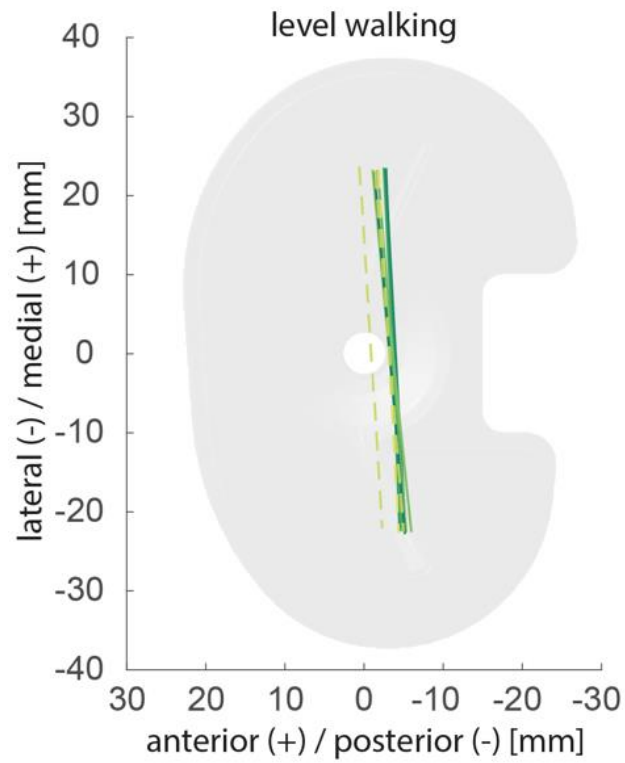
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2D → 3D registration

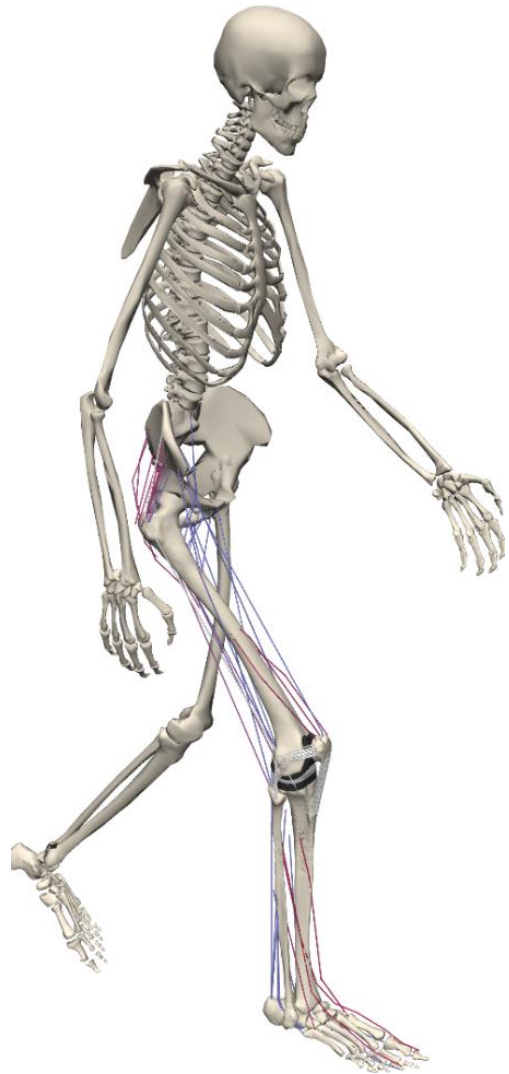


Impact of implant design on *in vivo* motion

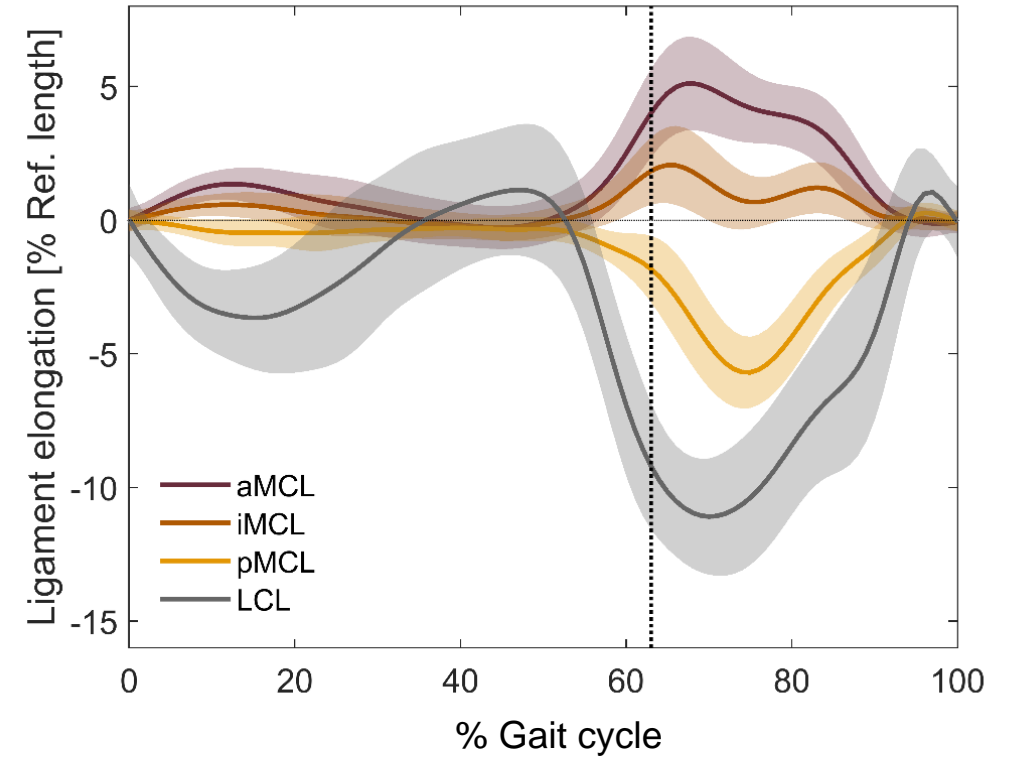


[Schütz et al. *J Orthop Res.* 2019]

Accurate input data for modeling approaches

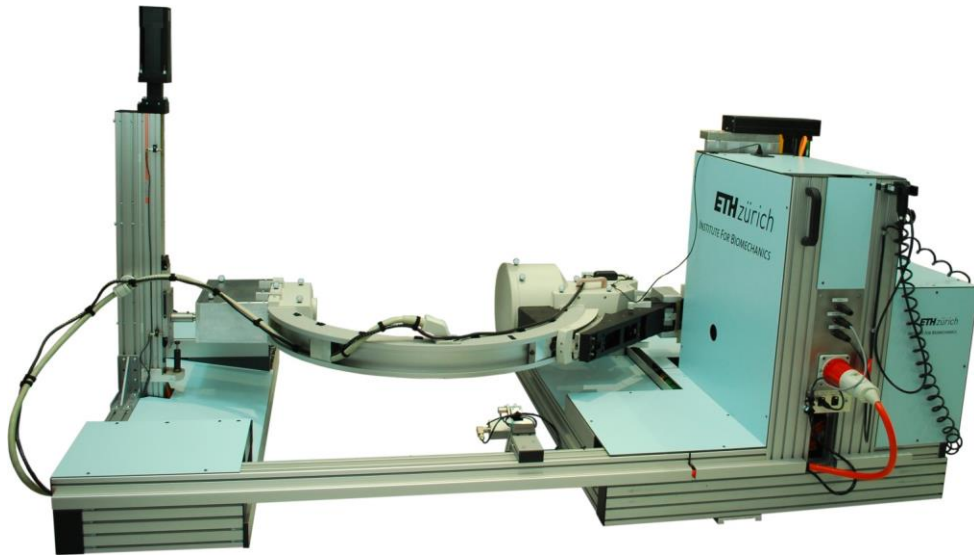


Accurate input data for modeling approaches



Limitations of the current device

- Limited to slow walking [Hitz et al. 2018]
- Single plane fluoroscopy
- Knee tracking using wire sensor
- C-arm and construction restrict the choice of activities

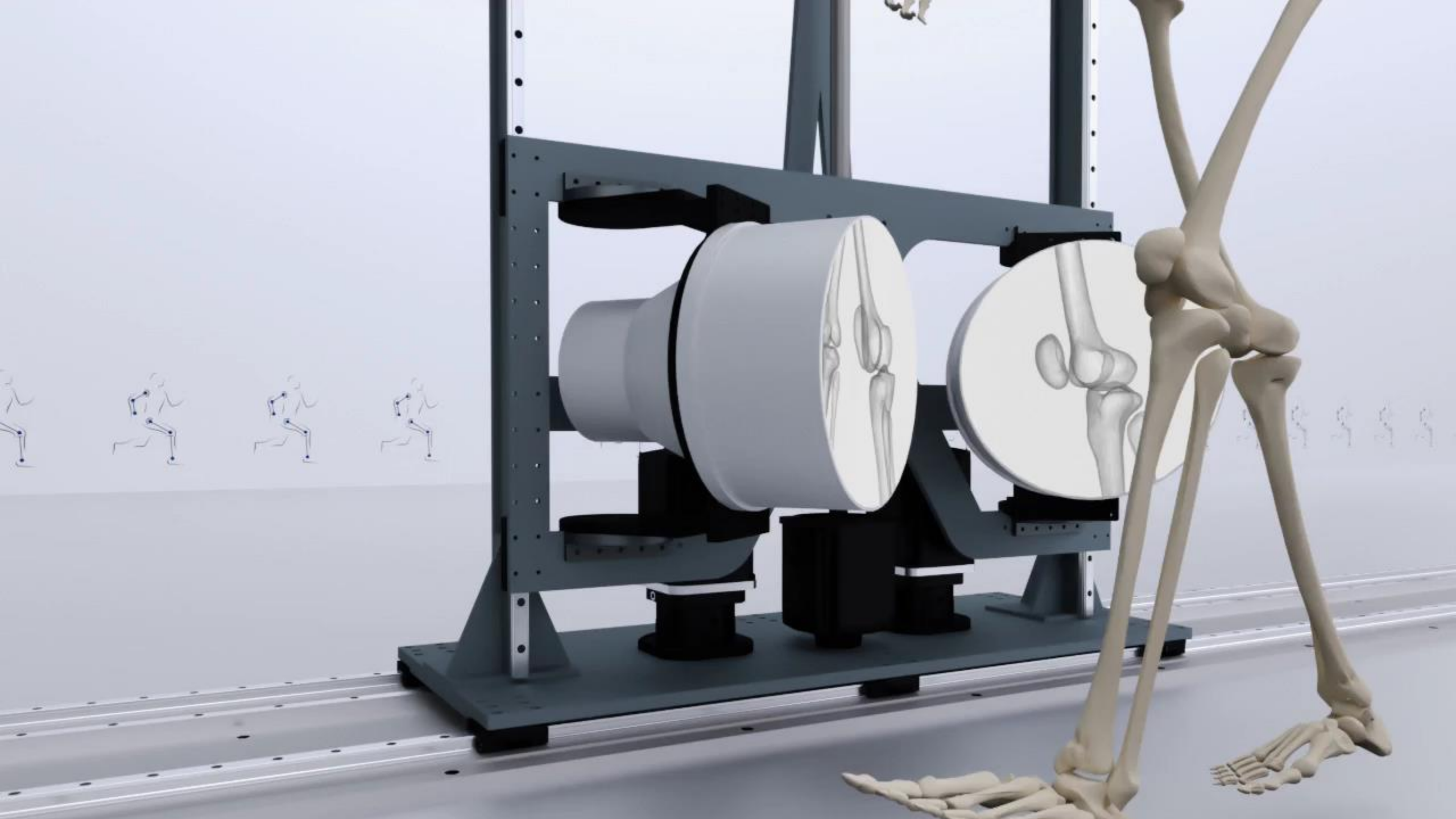


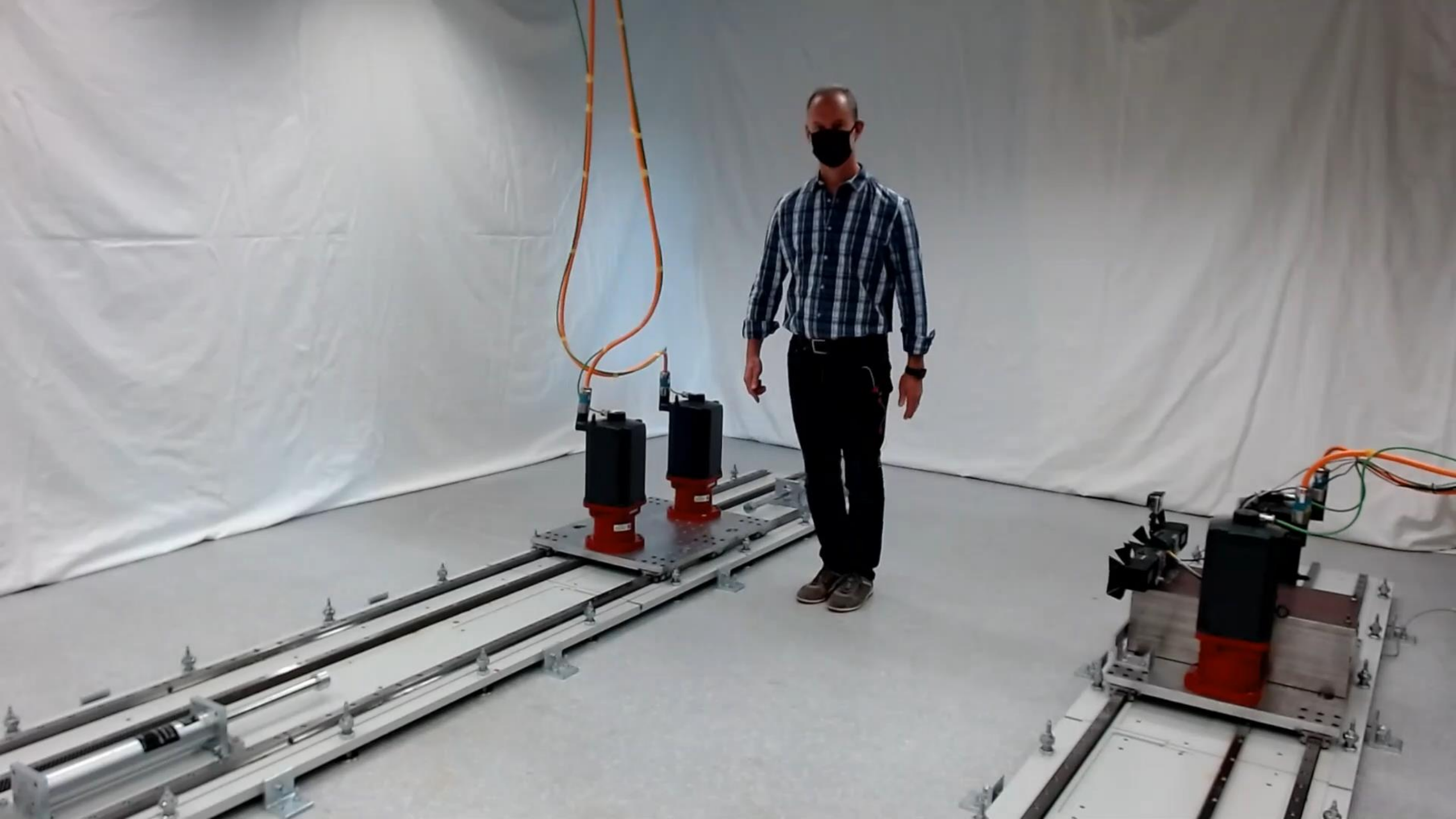
[List et al. PLoS One 2017]



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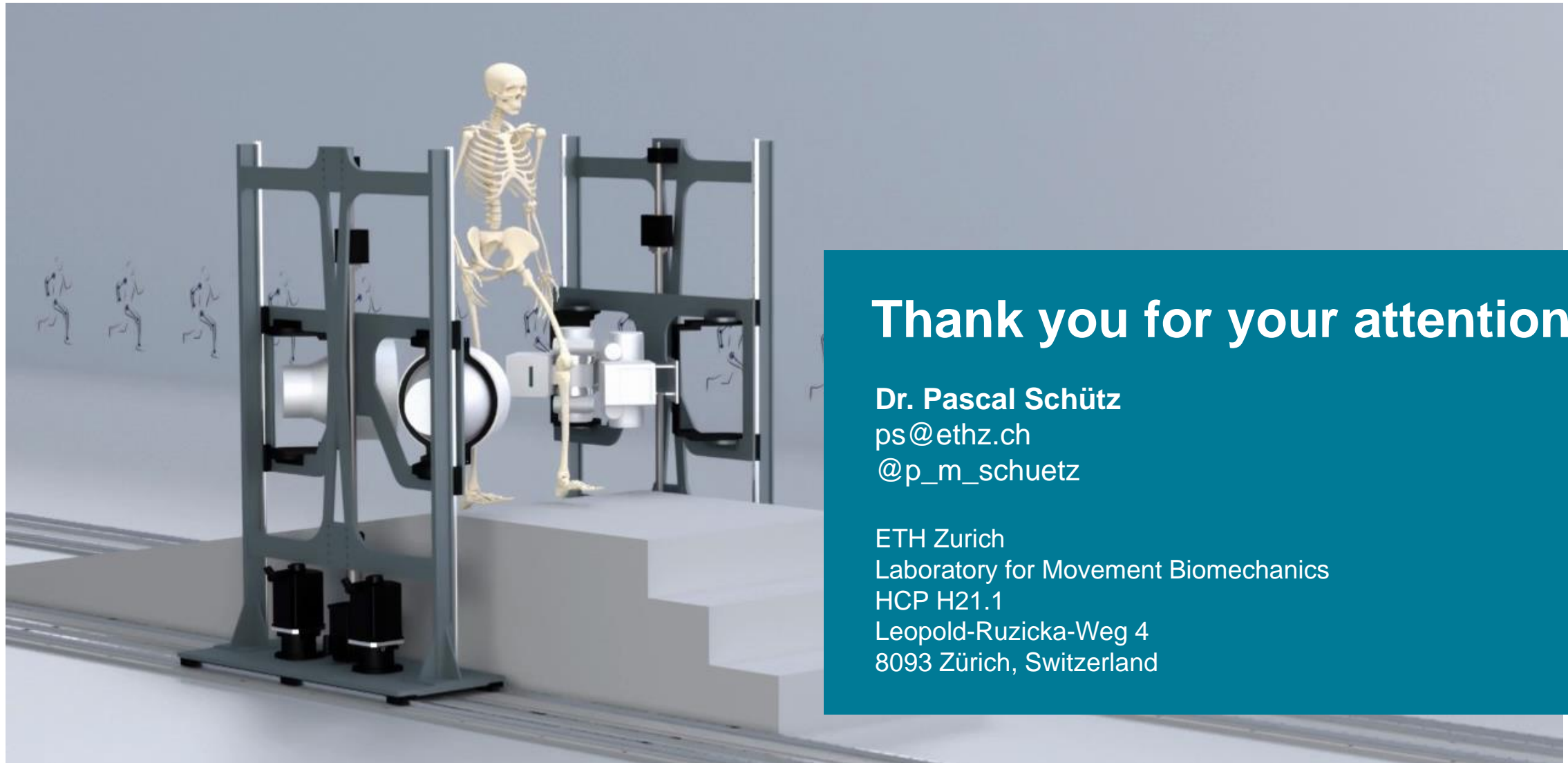




Take home message

The new dual-plane tracking fluoroscope will allow access to:

- **Accurate knee joint kinematics during highly dynamic activities in all 6 degrees of freedom**
- **Evaluation of implant functionality**
- **Evaluation of prosthetics**
- **Accurate input data for computational modeling**
- **Wear simulation**
- **Sports injury mechanisms**



Thank you for your attention!

Dr. Pascal Schütz

ps@ethz.ch

@p_m_schuetz

ETH Zurich

Laboratory for Movement Biomechanics

HCP H21.1

Leopold-Ruzicka-Weg 4

8093 Zürich, Switzerland