

# ***Curriculum Vitae***

## **Ludovica Apa**

### **Current position**

**From April 2022 to present:** Research fellow (AR) - Cat A (SSD ING-IND/12), Department of mechanical and aerospace engineering, University of Rome 'La Sapienza'. Project: Development of a new experimental system for the measurement of cell mechanotransduction following simultaneous application of substrate deformation and fluid shear stress.

### **Education and training**

- **February 13, 2020:** Phd in Industrial and Management Engineering, Sapienza University of Rome. Thesis: Development and validation of experimental systems for measurements of cell and tissue biomechanics.
- **March 22, 2016:** Master Degree in Biomedical Engineering, Sapienza University of Rome.
- **September 2015-March 2016:** Internship for Master Thesis, Epfl (école polytechnique fédérale de Lausanne), Switzerland, TNE (translational neural engineering) laboratory. Thesis: Development of a synergies-based controller for a musculoskeletal model of the human upper limb.
- **January 25, 2013:** Bachelor Degree in Clinical Engineering, Sapienza University of Rome.
- **October 2012-January 2013:** Internship for bachelor thesis, EEG laboratory (Department of physiology and pharmacology 'Vittorio Erspamer', Sapienza University of Rome). Thesis: Hypercapnia affects the functional coupling of resting state electroencephalographic rhythms and cerebral hemodynamics in healthy elderly subjects and in patients with mild cognitive impairment.

### **Work experiences**

- **April 1, 2021 – March 31, 2022:** Research fellow (AR) (SSD ING-IND/12), Department of mechanical and aerospace engineering, University of Rome 'La Sapienza'. Project: Sviluppo di sistemi sperimentali per la misura delle proprietà delle singole cellule.
- **April 1, 2020 – March 31, 2021:** Research fellow (AR) (SSD ING-IND/12), Department of mechanical and aerospace engineering, University of Rome 'La Sapienza'. Project: Sviluppo di sistemi sperimentali per la misura delle proprietà delle singole cellule.

## Teaching experiences

- **2020-Present:** Member of the examining commission of Mechanical and Thermal Measurements course (SSD ING-IND/12) for the BD in Clinical Engineering and for the MD in Mechanical Engineering, University of Rome 'La Sapienza'.
- **2020-Present:** Member of the examining commission of Biomechanics and Tissue Engineering Laboratory course (SSD ING-IND/12) for the MD in Biomedical Engineering, University of Rome 'La Sapienza'.
- **2017-Present:** Responsible for laboratory exercises for the course "Biomechanics and Tissue Engineering Laboratory" (SSD ING-IND/12) for the MD in Biomedical Engineering, University of Rome 'La Sapienza'.
- **2017-Present:** Responsible for laboratory exercises for the course "Mechanical and Thermal Measurements" (SSD ING-IND/12) for BD in Clinical Engineering, University of Rome 'La Sapienza'.
- **2017-Present:** Tutor of 25 graduate students of Clinical Engineering, Sapienza University of Rome.
- **2017-Present:** Co-tutor of 3 graduate students of Biomedical Engineering, Sapienza University of Rome.

## Courses and qualifications

- **2020-Present:** "Subject expert" (cultore della materia) for the courses in SSD ING-IND/12: Mechanical and Thermal Measurements (MMER and BCLR) and Biomechanics and Tissue Engineering Laboratory (MBIR).
- **May 10-11, 2018:** ECM Course, Forum in Bone and Mineral Research XVIII Meeting, University Campus Bio-Medico, Rome.
- **January 30-31, 2017:** Labview Core 2 course, National Instruments.
- **December 12-14, 2016:** Labview Core 1 course, National Instruments.
- **September 2016:** Qualification to practice as an Industrial Engineer, Sapienza University of Rome.

## Awards, grants and memberships

- **2021:** Investigator in the project: Combining mechanical signals to enhance cell mechanotransduction: a new experimental paradigm for simultaneous application of substrate deformation and fluid shear stress. Academic research project, University of Rome 'La Sapienza'. P.I. Prof. Del Prete. Funds: 13.000,00 €.
- **2020:** Proceeding winner of the "Domenico Grimaldi Best Paper Award". The Cell-Matrix Interplay: Stiffness and Strain Homogeneity Characterization of Substrates for Adherent Cells. S. Carraro, L. Apa, E. Urcioli, B. Peruzzi, Z. Del Prete, E. Rizzuto, at the IEEE International Symposium on Medical Measurements and Applications, MeMeA.

- **2019:** Investigator in the project: Design and testing of an experimental system for assessing adherent single-cell stiffness in tension. Academic research project, 'Sapienza' University of Rome. P.I. Prof. Rizzuto. Funds: 36.987,00 €.
- **2018:** Member of the IEEE Instrumentation and Measurement society. Member number: 94951052.
- **2017:** Uniaxial strain device for in vitro mechanical stimulation of normal and tumoral bone cells. Academic research project. Funds: 1.000,00 €.

### Reviewer activity

- **2023:** Co-guest editor of the Special Issue: 'Thermo-Mechanical and Electrical Measurements for Energy Systems' for the journal Energies (MDPI).
- **2019-Present:** Reviewer for the following journal: Journal of Healthcare Engineering; IEEE Transactions on Instrumentation and Measurement.
- **June 2022:** Chair at the Special Session: Innovative Biosensors and Sensor Systems for the Monitoring of Degenerative Diseases. IEEE International Symposium on Medical Measurements and Applications, MeMeA.
- **June 2021:** Member of the reviewer board (TPC) of the IEEE International Symposium on Medical Measurements and Applications, MeMeA.
- **June 2019:** Member of the reviewer board (TPC) of the IEEE International Symposium on Medical Measurements and Applications, MeMeA.

### International and national conferences

#### \*: speaker

- **September 2022:** VI forum of the National Mechanical and Thermic Measurements, Brescia, Italy. "Strain field characterization of a stretching device for in vitro cell mechanotransduction" L. Apa, F. Forconi, B. Peruzzi, E. Rizzuto, Z. Del Prete. Poster presentation.
- **June 2022:** IEEE International Symposium on Medical Measurements and Applications, MeMeA, Taormina, Italy. "Effects of ROI positioning on the measurement of engineered muscle tissue contractility with an optical tracking method", F. Forconi, **L. Apa**, M. Cosentino, A. Musarò, E. Rizzuto, Z. Del Prete.
- **June 2019:** IEEE International Symposium on Medical Measurements and Applications, MeMeA, Instabul, Turkey. "Design of a new device to measure skeletal muscle engineered tissues' contractile force by using an optical tracking technique", **L. Apa\***, F. Martelli, E. Rizzuto, Z. Del Prete.
- **June 2018:** IEEE International Symposium on Medical Measurements and Applications, MeMeA, Rome, Italy. "Development and mechanical validation of an in vitro system for bone cell vibration loading", **L. Apa\***, E. Urciuoli, L. D'alvia, B. Peruzzi, Z. Del Prete, E. Rizzuto.

- **September 2017:** VI forum of the National Mechanical and Thermic Measurements, Modena, Italy.

## Publications list

### Journal articles

- **L. Apa**, M. Cosentino, F. Forconi, A. Musarò, E. Rizzuto, Z. Del Prete, “The development of an innovative embedded sensor for the optical measurement of ex-vivo engineered muscle tissue contractility”, *Sensors*, vol. 22, no. 18, pp. 6878, September 2022.
- F. Forconi, **L. Apa**, S. Pisu, I. Casola, A. Musarò, E. Rizzuto, Z. Del Prete, “Development of a novel technique for the measurement of neuromuscular junction functionality in isotonic conditions”, *Cellular and Molecular Bioengineering*, vol. 15, no. 3, 255-265, June 2022.
- **L. Apa**, S. Carraro, S. Pisu, B. Peruzzi, E. Rizzuto, Z. Del Prete, “Development and validation of a device for in vitro uniaxial cell substrate deformation with real-time strain control”, *Measurement Science and Technology*, vol. 31, no. 12, pp. 125702, June 2020.
- S. Pisu, M. Cosentino, **L. Apa**, A. Musarò, E. Rizzuto, Z. Del Prete, “Measuring the Maximum Power of an ex vivo Engineered Muscle Tissue with Isovelocity Shortening Technique”, *IEEE Trans. Instrum. Meas.*, vol. 68, no. 7, pp. 2404–2411, Jul. 2019.

### Conference Proceedings

- F. Forconi\*, **L. Apa\***, M. Cosentino, A. Musarò, E. Rizzuto, Z. Del Prete, “Effects of ROI positioning on the measurement of engineered muscle tissue contractility with an optical tracking method”, *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Messina, Italy, 2022.
- F. Forconi\*, **L. Apa\***, L. D’Alvia, M. Cosentino, E. Rizzuto, Z. Del Prete, “Electric field distribution analysis for the design of an electrode system in a 3D neuromuscular junction microfluidic device”, *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Lausanne, Switzerland, 2021.
- S. Carraro, **L. Apa**, E. Urciuoli, B. Peruzzi, Z. Del Prete, E. Rizzuto, “The cell-matrix interplay: Stiffness and strain homogeneity characterization of substrates for adherent cells”, *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Rome, Italy, 2020.
- **L. Apa**, F. Martelli, E. Rizzuto, Z. Del Prete, “Design of a new device to measure skeletal muscle engineered tissues’ contractile force by using an optical tracking

technique”, IEEE International symposium on medical measurements and applications (MeMeA), Istanbul, Turkey, 2019.

- **L. Apa**, E. Urciuoli, L. D’Alvia, B. Peruzzi, Z. Del Prete, E. Rizzuto, “Development and mechanical validation of an in vitro system for bone cell vibration loading”, IEEE International symposium on medical measurements and applications (MeMeA), Rome, Italy, 2018.
- S. Pisu, **L. Apa**, M. Cosentino, A. Musaro, E. Rizzuto, and Z. Del Prete, “Measuring the X-MET’s maximum power: A preliminary study”, IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rome, Italy, 2018.

\*These authors contributed equally to the work.

### Conference Abstracts

- **L. Apa**, F. Forconi, B. Peruzzi, E. Rizzuto, Z. Del Prete, “Strain field characterization of a stretching device for in vitro cell mechanotransduction”. National Symposium on Mechanical and Thermal Measurements, Brescia, Italy, September 15-17, 2022.
- **L. Apa**, M. Cosentin, A. Musarò, E. Rizzuto, Z. Del Prete, “Caratterizzazione di un metodo ottico per la misura della forza di contrazione di un tessuto ingegnerizzato in vitro”. National Symposium on Mechanical and Thermal Measurements, Messina, Italy, September 10-12, 2020.
- E. Rizzuto, F. Martelli, **L. Apa**, Z. Del Prete, “Determinazione dell’accuratezza di un sistema sperimentale per la misura della potenza generata dai tessuti muscolari ingegnerizzati *in vitro*”. National Symposium on Mechanical and Thermal Measurements, Perugia, Italy, September 12-14, 2019.

*According to law 679/2016 of the Regulation of the European Parliament of 27th April 2016, I hereby express my consent to process and use my data provided in this CV.*

Rome, 31/01/2023

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