

XLII ANNUAL SCHOOL THE BIOENGINEERING OF SPORT

September 11 – 14, 2023

 Aula Magna, Casa della Gioventù universitaria,
Università di Padova, Via Rio Bianco, 12, 39042 –
Brixen (Italy) & online

Aim of the School

The impact of technology on sports is rapidly increasing, fostered by technological progress and digitalization. This school aims at offering students an overview of latest trends and operative tools to assess and enhance athlete performance, to prevent or to recover from injury, and to support coaching staff through bioengineering approaches. The activities of the school will include lectures by recognized experts and hands-on computational projects on how to build an “athlete digital passport”. This integrates metrics for monitoring the musculoskeletal, cardiovascular, respiratory and metabolic system of the athlete, as well as in-field sport data analytics, to improve sport training, to perfect athletic movement and sport gestures, and to reduce the risk of injuries.

Chairs:

Laura Burattini (UNIVPM)

Valentina Camomilla (UNIROMA4)

Marco Knaflitz (POLITO)

Scientific Organizers:

Micaela Morettini, Agnese Sbrollini (UNIVPM)

Elena Bergamini, Giuseppe Vannozzi (UNIROMA4)

Valentina Agostini, Andrea Cereatti, Marco Gazzoni (POLITO)

Local Organizers:

Gruppo Nazionale di Bioingegneria (GNB)

Organizing Secretary:

Pragma Congressi (Pavia)



UNIVERSITÀ
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UNIVERSITÀ DEGLI STUDI DI ROMA "FORO ITALICO"



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Sport bioengineering exploits engineering principles to evaluate and enhance sport performances and protect athletes' safety. A timely monitoring of sports and exercise, aimed at improving performance as well as preventing or recovering from injury, is a key part of the contemporary sports and fitness industry and entails the use of technology to collect and analyze data.

Bioengineering potential in this field has been greatly expanded by the rise of **big-data science** and **wearable technology** allowing possible and affordable data collection, for mainstream sports. Transforming raw data into actionable insights requires rooting this transformation into a trans-domain competence which should nurture research development towards bridging the gap between bioengineering development and sports stakeholders.



The **XLII GNB school** brings students to consider the specificity of the sport domain in problems and applications of biomedical engineering, combining the need for extremely accurate information with the challenge of unfavorable measuring and data analysis scenarios. Indeed, the applications are not limited to elite athletes and high-level sport clubs. Rather, they extend to other contexts where resources may be lacking (e.g., young athletes, non-professional athletes, athletes/persons with disability).

Benefitting from the on-field experience of lecturers, mentors, and keynote speakers, the school will follow a **hands-on teaching approach**. Students will collaboratively explore the building bricks of defining an athlete's profile for safe and efficient performance.



The school will widen the perspective on the students bioengineering culture, allowing them to intersect the increasingly important **sports monitoring research and practice**.

Speakers

(in alphabetical order)

Agostini V. (POLITO)
Aliverti A. (POLIMI)
Ambrosini E. (POLIMI)
Bailon R. (UNIZAR)
Barbieri R. (POLIMI)
Bergamini E. (UNIROMA4)
Bibbo D. (UNIROMA3)
Bondi D. (UdA)
Brocchini M. (UNIVPM)
Burattini L. (UNIVPM)
Camomilla V. (UNIROMA4)
Castiglione F. (IAC CNR)
Cereatti A. (POLITO)
Cerone G.L. (POLITO)
Comani S. (UdA)

Cutti A.G. (INAIL)
Di Stanislao E. (ITOP)
Facchinetti A. (UNIPD)
Fantozzi S. (UNIBO)
Ghislieri M. (POLITO)
Giacomozzi C. (ISS)
Knaflitz M. (POLITO)
Llorca D. (NUBOO)
Massaroni C. (CAMPUS BIOMED)
Mationi Maturana F. (UNITUBINGEN)
Morettini M. (UNIVPM)
Nicolò A. (UNIROMA4)
Palumbo M.C. (IAC CNR)
Pani D. (UNICA)
Pavei G. (UNIMI)

Pedrizetti G. (UNITS)
Pedrocchi A. (POLIMI)
Preatoni E. (UNIBATH)
Pozzi M. (ORA)
Ramat S. (UNIPV)
Sacchetti M. (UNIROMA4)
Sawacha Z. (UNIPD)
Sbrollini A. (UNIVPM)
Spanu A. (UNICA)
Tripodi V. (POLITO)
Vannozzi G. (UNIROMA4)
Zitti G. (UNIVPM)
Zok M. (N3XT SPORTS)

School Program

	Monday-11/09/2023	Tuesday-12/09/2023	Wednesday-13/09/2023	Thursday-14/09/2023
9.00-9.15	Opening of the GNB School (Burattini L., UNIVPM; Camomilla V., UNIROMA4; Knaflitz M., POLITO)	Cardiovascular safety in sport: the issue of prevention (Pozzi M., ORA)	Exercise and Metabolism: addressing the problem (Sacchetti M., UNIROMA4)	Human Neuroscience in Sport Sciences (Comani S., UdA)
9.15-9.30				
9.30-9.45				
9.45-10.00	Movement in sport: addressing the problem (Preatoni E., UNIBATH)	Cardiac modeling in sport (Pedrizzetti G., UNITS)	Mathematical modelling in exercise immunometabolism (Moretini M., UNIVPM)	Biomechanics and bioenergetics in sport (Pavei G., UNIMI)
10.00-10.15				
10.15-10.30				
10.30-10.45	Movement devices (IMU, stereo, video, GPS) (Vannozzi G., UNIROMA4)	Vascular modelling in sport (Brocchini M./Zitti G., UNIVPM)	Computational modelling of fuel homeostasis during exercise (Castiglione F./Palumbo M.C., IAC CNR)	Musculoskeletal modeling in sport (Sawacha Z., UNIPD)
10.45-11.00				
11.00-11.15				
11.15-11.30	Movement devices (force, pressure) (Giacomozzi C., ISS)	Cardiovascular devices (Llorca D., NUBOO)	Continuous glucose monitoring: past, present and future challenges (Facchinetti A., UNIPD)	Gaze orientation and stabilization in sport (Ramat S., UNIPV)
11.30-11.45				
11.45-12.00				
12.00-12.15	Unconventional electrodes for unobtrusive biopotentials monitoring: from wearable to more-than-wearable (Pani D./Spanu A., UNICA)	ECG signal processing in sport (ECG) (Bailon R., UNIZAR)	Hands-on session on: Analysis of glycemic variability during sport (Mationi Maturana F., UNITUBINGEN; Moretini M., UNIVPM)	Engineering solutions for sport inclusion (Di Stanislao E., ITOP)
12.15-12.30				
12.30-12.45				
12.45-13.00	Lunch Break	Lunch Break	Lunch Break	Lunch Break
13.15-13.30				
13.30-13.45				
13.45-14.00	Multimodal movement analysis in cycling (Bibbo D., UNIROMA3)	The importance of breathing monitoring in sport and exercise (Nicoló A., UNIROMA4)	Lunch Break	Lunch Break
14.00-14.15				
14.15-14.30				
14.30-14.45	Hands-on session on: In field signal processing in running (Bergamini E., UNIROMA4)	Respiratory devices (Aliverti A., POLIMI)	Award Ceremony	Etica nello sport - Doping e doping tecnologico (Tripodi V., POLITO)
14.45-15.00				
15.00-15.15				
15.15-15.30	Biomechanical analysis of foot strike patterns with wearable sensors in running (Fantozzi S., UNIBO)	Signal processing in respiration (Massaroni C., CAMPUS BIOMED)	Lectio Magistralis: Data Analytics (Zok M., N3XT SPORTS)	Students' pitch & Awards
15.30-15.45				
15.45-16.00				
16.00-16.15	Extraction of muscle synergies in sport (Agostini V., POLITO)	Hands-on session on: Cardiovascular self monitoring in sport (Sbrollini A., UNIVPM)	Hands-on session on: Data analytics (Cereatti A., POLITO)	Closing Ceremony
16.15-16.30				
16.30-16.45				
16.45-17.00	Extraction of muscle synergies in sport: application to the evaluation of chronic ankle instability (Ghislieri M., POLITO)	Respiration in extreme environments (Bondi D., UdA)		
17.00-17.15				
17.15-17.30				
17.30-17.45				Soccer match / Apertif buffet
17.45-18.00				
18.00-18.15				
18.15-18.30				

Hands-on session

Break

Social and other activities

All registration fees, except for «Student – light», include the school book (by Patron).

All registrations fees include VAT.

For GNB members:

	Participants	Early bird (up to Aug 11, 2023)	Late (up to Sep 5, 2023)	Onsite*
PHYSICAL ATTENDANCE	Standard	300€	400€	500€
	PhD student	140€	190€	240€
	One day	-	-	150€
VIRTUAL ATTENDANCE	Standard	110€	160€	-
	PhD student	60€	90€	-

For NON-GNB members**:

	Participants	Early bird (up to Aug 11, 2023)	Late (up to Sep 5, 2023)	Onsite*
PHYSICAL ATTENDANCE	Standard	490€	650€	780€
	Endorsed society	370€	490€	615€
	PhD student	200€	290€	435€
	One day	-	-	235€
VIRTUAL ATTENDANCE	Standard	240€	320€	-
	Endorsed society	180€	240€	-
	PhD student	120€	180€	-
	Student	65€	100€	-
	Student - light	25€	60€	-

*upon sits availability

**GNB STANDARD MEMBERSHIP 50€; GNB PHD-STUDENT MEMBERSHIP 30€

To register to the school as a GNB member, GNB membership code is required. To become a member, please visit: <https://soci.grupponazionalebioingegneria.it/utenti/front/accedi>.