



# 17th CCM meeting

## BIPM – París 2019

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**SIM MWG7: Mass and Related Quantities**

**Chairman: Aldo Quiroga Rojas**

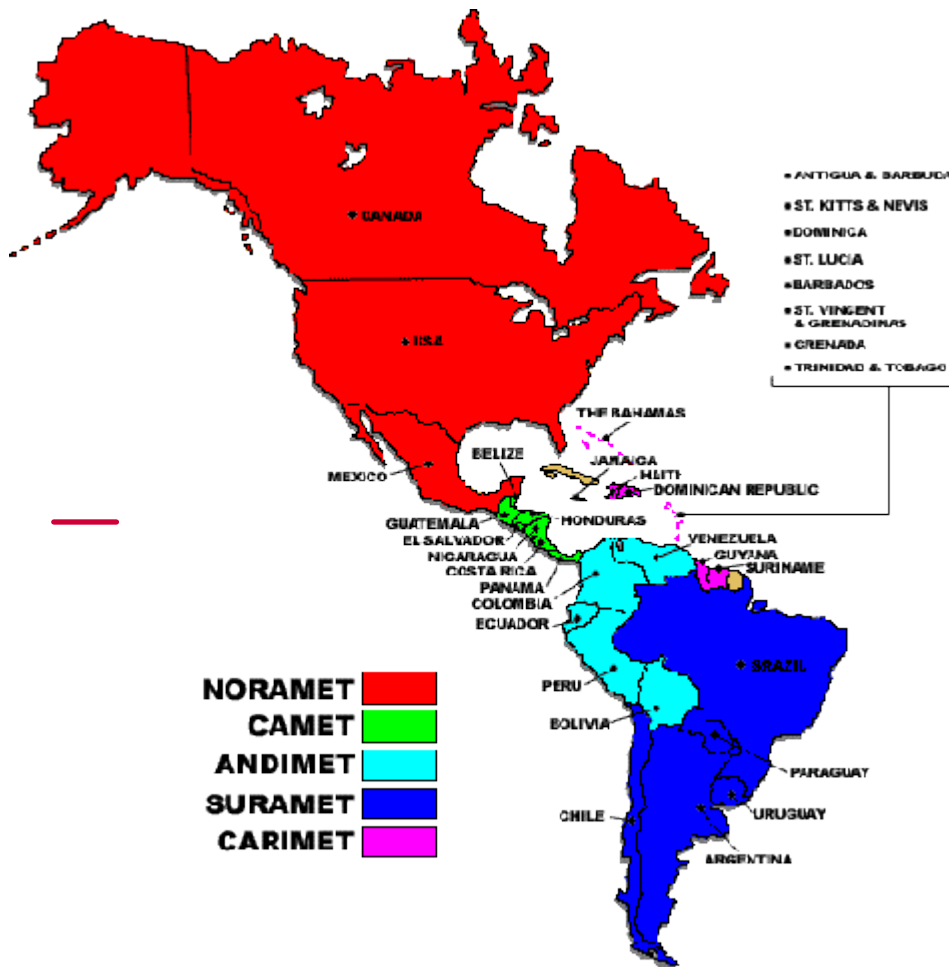


Perú, calidad que deja huella



PERÚ

Ministerio  
de la Producción



SIM.- Organized in five subregions (34 countries):

Noramet: North America, 3 NMI

Carimet: Caribbean 14 NMI

Camet: Central America 7 NMI

Andimet: South America 5 NMI

Suramet: South America 5 NMI

## SIM WG 7. Mass and Related quantities Internal structure and co-chairs (2017-2019)

Chair		Aldo Quiroga	INACAL (Perú)	aquiroga@inacal.gob.pe
Co-chairs	Density	Luis Omar Becerra	CENAM (Mexico)	becerra@cenam.mx
	Force	Alejandro Savarin	INTI (Argentina)	asavarin@inti.gob.ar
	Pressure	Jorge Torres	CENAM (Mexico)	jtorres@cenam.mx
	Mass	Luis Manuel Peña	CENAM (Mexico)	lpena@cenam.mx
	Hardness	Sérgio P. de Oliveira	INMETRO (Brazil)	spoliveira@inmetro.gov.br

## CMCs : Approved - 2017

INMETRO	Mass (1 mg to 500 kg) and Volume of weight ( 1 g to 2 kg)	Interregional	SIM.M.29.2016 (2017-06-23)
IBMETRO	Mass (1 mg to 1 kg)	Interregional	SIM.M.35.2017 (2017-07-21)
INM	Density (0,6 g/cm <sup>3</sup> to 1,3 g/cm <sup>3</sup> )	Interregional	SIM.M.34.2016 (2017-07-21)

## CMCs : Approved - 2018

INACAL, LATU	Volume of liquids ( 1 mL to 2o L)	Interregional	SIM.M.33.2016 (2018-08-06)
INM	Force (0,1 kN to 1000 kN)	Interregional	SIM.M.37.2017 (2018-05-29)

## CMCs in Process

CENAMEP	Force	Interregional	SIM.M.36.2017
CENAMEP	Volume of liquids	Interregional	SIM.M.38.2017
INACAL	Mass (1 mg to 20 kg) In progress	Interregional	SIM.M.39.2018
INTN	Mass(1 mg to 20 kg) In progress	Interregional	SIM.M.40.2019
LATU LACOMET	Volume of liquids In progress	Interregional	SIM.M.41.2019
INM	Mass In Progress	Interregional	SIM.M.42.2019

## Comparison : 2017 – 2019

SIM.M.M-S11	Mass (2 kg, 1 kg, 200 g, 50 g, 1 g, and 200 mg)	Approved
SIM.M.M-S13	Mass (10 kg and 2 kg)	Approved and published
SIM.M.M-D4	Hydrometers (600 kg/m <sup>3</sup> and 2 000 kg/m <sup>3</sup> )	Approved and published
SIM.M.G-K1	Determination of free-fall acceleration	Approved for equivalence
SIM.M.D-S6	Hydrometers (600 kg/m <sup>3</sup> and 1 300 kg/m <sup>3</sup> )	Measurement completed
SIM.M.M-S16	Mass (200 mg, 1 g, 50 g, 200 g, 1 kg and 2 kg)	Draft B
SIM.M.M-S17	Mass (200 mg, 1 g, 50 g, 200 g, 1 kg and 2 kg)	Measurement completed
SIM.M.M-S18	Mass (20 kg)	Measurement completed
SIM.M.M-K6	Mass (50 kg)	Measurement completed
SIM.M.F-S2	Force (10 kN to 100 kN)	Draft A
SIM.M.F-S4	Force (50 kN to 100 kN)	In progress
SIM.M.F-S6	Force (500 kN to 1000 kN)	Draft A
SIM.M.F-S7	Force (10 kN to 100 kN)	Measurement completed
SIM.M.F-S8	Force (20 kN to 100 kN): Testing Machine	Measurement completed

## CMCs : Review - 2017

NMI - Australia	Mass (1 mg to 20 kg)	APMP.M.44.2017
UNIIM, Russian Federation	Force (20 Nm to 2500 Nm)	COOMET.M.28.2017
VNIIM, Russian Federation	Pressure (0,1 Pa to 10000 Pa)	COOMET.M.30.2017
MIKES, Finland	Mass (20 kg to 2000 kg)	EURAMET.M.48.2017
HMI/FSB-LIMS, Croatia	Force (10 kN to 500 kN)	EURAMET.M.49.2017
PTB, Germany	Density (600 kg/m <sup>3</sup> to 2000 kg/m <sup>3</sup> )	EURAMET.M.51.2017
METROSERT, Estonia	Mass (1 mg to 50 kg)	EURAMET.M.53.2017
BEV, Austria	Mass (1mg to 1 g)	EURAMET.M.54.2017
METAS, Switzerland	Pressure (0,0001 Pa to 1 Pa)	EURAMET.M.55.2017

## CMCs : Review 2018

NSI, Namibia	Mass (1 mg to 20 kg)	AFRIMETS.M.6.2018
NPL, United Kingdom	Density (750 kg/m <sup>3</sup> to 1000 kg/m <sup>3</sup> )	EURAMET.M.56.2018
INRIM, Italy	Absolute Pressure (3 Pa to 7 MPa) Pressure (-97 kPa to 500 MPa)	EURAMET.M.58.2018
IPQ, Portugal	Pressure (-10 kPa to -0,5 kPa)	EURAMET.M.59.2018
IMBiH, Bosnia and Herzegovina	Pressure (4 kPa to 350 kPa)	EURAMET.M.60.2018
PTB, Germany	Hardness reference blocks (HV 0,01 to HV 125) , (HR 15N to HR 45N), (HR 15TW to HR 45TW)	EURAMET.M.61.2018
INRIM, Italy	Mass (50 kg to 100 kg)	EURAMET.M.62.2018





### CMCs : Review 2019c

(SIRDC-NMI), Zimbabwe	Mass (1 mg to 5 kg)	AFRIMETS.M.7.2019
VÚGTK, Czech Republic	Absolute measurement of Gravity (9,75 m/s <sup>2</sup> to 9,85 m/s <sup>2</sup> )	EURAMET.M.63.2019
DMDM Republic of Serbia	Pressure (20 kPa to 100 MPa)	EURAMET.M.642019

### SIM activities: 2017

- Meeting MWG7: “Validation of an alternative method for the calibration of Microbalance”. From 21 to 24 of november (INTI argentina). INM participants: CESMEC – Chile, CENAM – México, INACAL – Perú, INTI – Argentina, LATU – Uruguay and INM - Colombia. In the INTI began the validation of the method “Calibration of Weighing Instruments Microbalances”

## SIM activities: 2017

### SIM MW7 MEETING



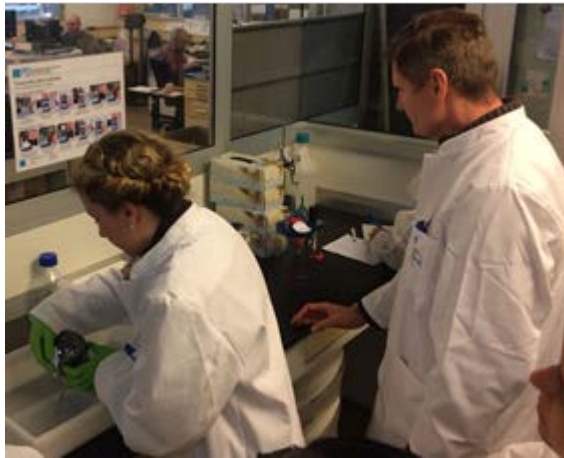
**Foto 1**  
**INTI mass lab**



**Foto 2**  
**INM participants**

## SIM activities: 2018

- SIM – PTB Meeting: “Study of the Silicon sphere (kilogram-prototipe) and dissemination of mass (kibble balances)”. From 19 to 23 of March (LATU - Uruguay).



**Foto 3**  
**Cleaning the Silicon sphere**



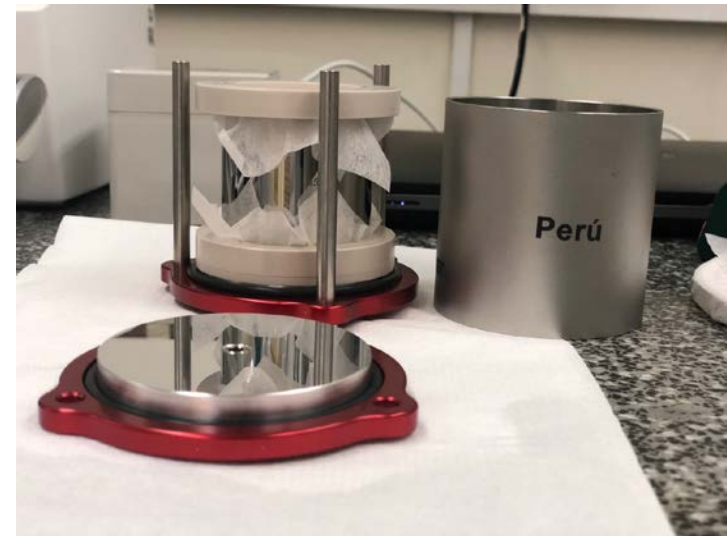
**Foto 4**  
**INM participants**

## SIM activities: 2018

- NIST Meeting: “SIM MASS SYMPOSIUM: Study of the Planck constant”. From 25 to 27 of September.



**Foto 5**  
**Kibble balances Lab**



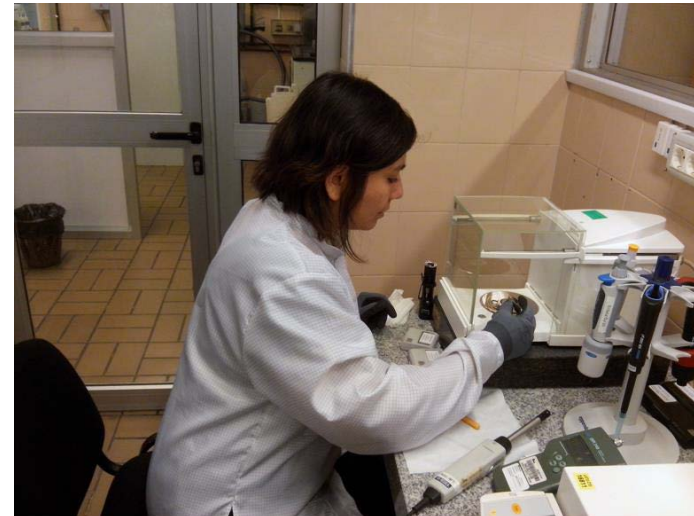
**Foto 6**  
**Standard weight with  
traceability to the Planck constant**

## SIM activities: 2019

“ Calibration of Weighing Instruments Microbalances ”. From 10 to 14 of March (LATU - Uruguay).



**Foto 7**  
**LATU Microbalances**



**Foto 8**  
**Calibration of Microbalances**



## SIM planned activities: 2019

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Workshop of SIM Density group. From 04 to 07 of June (LACOMET, San José - Costa Rica).  
Cuckow method, reference liquids and oscillating densimeters (U-tube).

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# Muchas Gracias