



COST

European Network on New Sensing Technologies for Air Pollution Control
and Environmental Sustainability - *EuNetAir*

COST Action TD1105

WGs and MC Meeting at Cambridge, 18-20 December 2013

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year 2: 1 July 2013 - 30 June 2014 (*Ongoing Action*)

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Function in the Action

Member of MC, WG3, SIG2

University College Cork, Ireland



 **cost**
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY





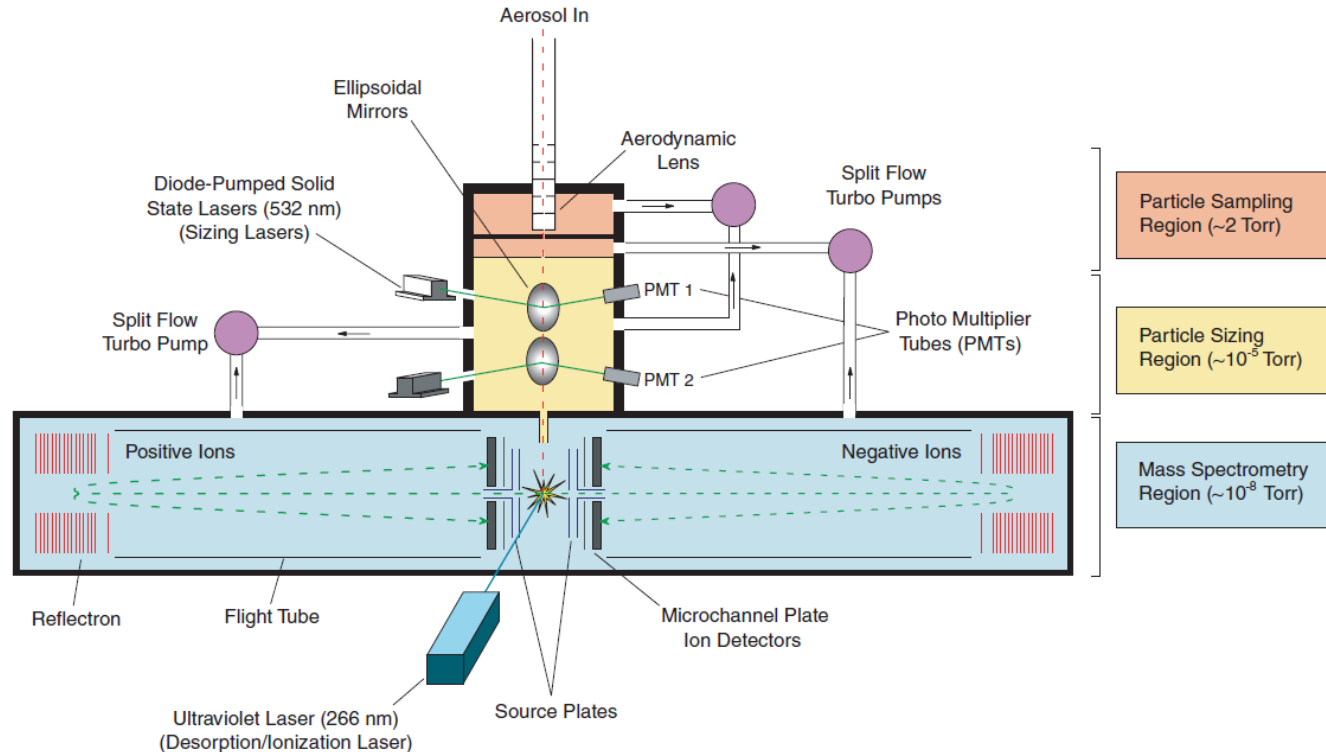
Scientific context and objectives in the Action

- **Background / Problem statement:** What are the levels and sources of key air pollutants (PM_{2.5}, NO_x) in urban areas of Ireland? How do pollutant levels vary both spatially and temporally?
- **Brief reminder of MoU objectives:** Co-location of new sensor technologies alongside a range of conventional air quality analyzers at selected sites. Possible deployment as part of air quality sensor networks in cities.

Current research activities of the Partner

- **Chemical composition and sources of PM_{2.5}**

Real-time analysis using Single Particle Mass Spectrometry

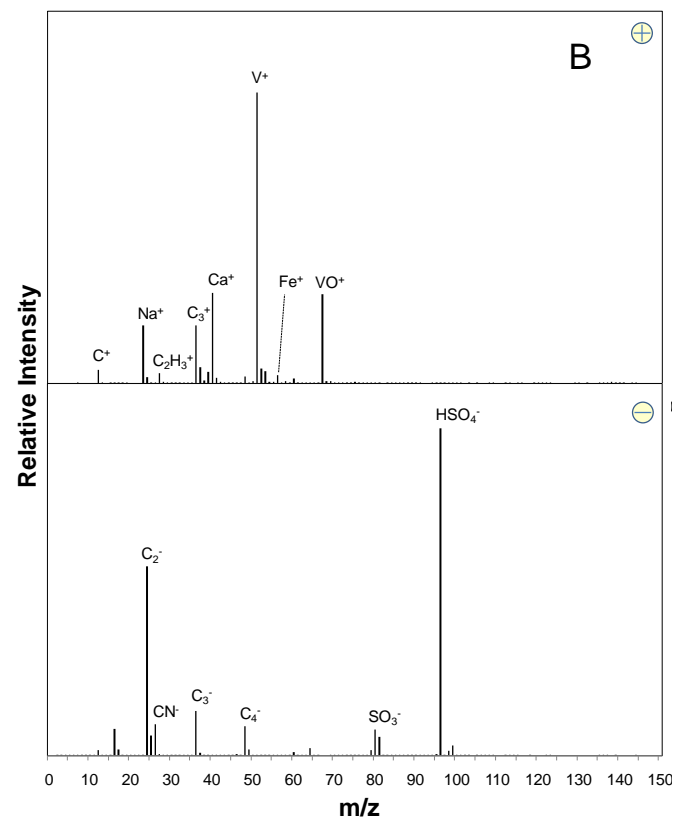


Current research activities of the Partner

- **Chemical composition and sources of PM2.5**

Real-time analysis using Single Particle Mass Spectrometry

- Detects elemental carbon, organic carbon, metals, inorganic ions for single particles
- Provides size-resolved chemical composition
- Allows determination of chemical mixing state (internal or external mixtures)



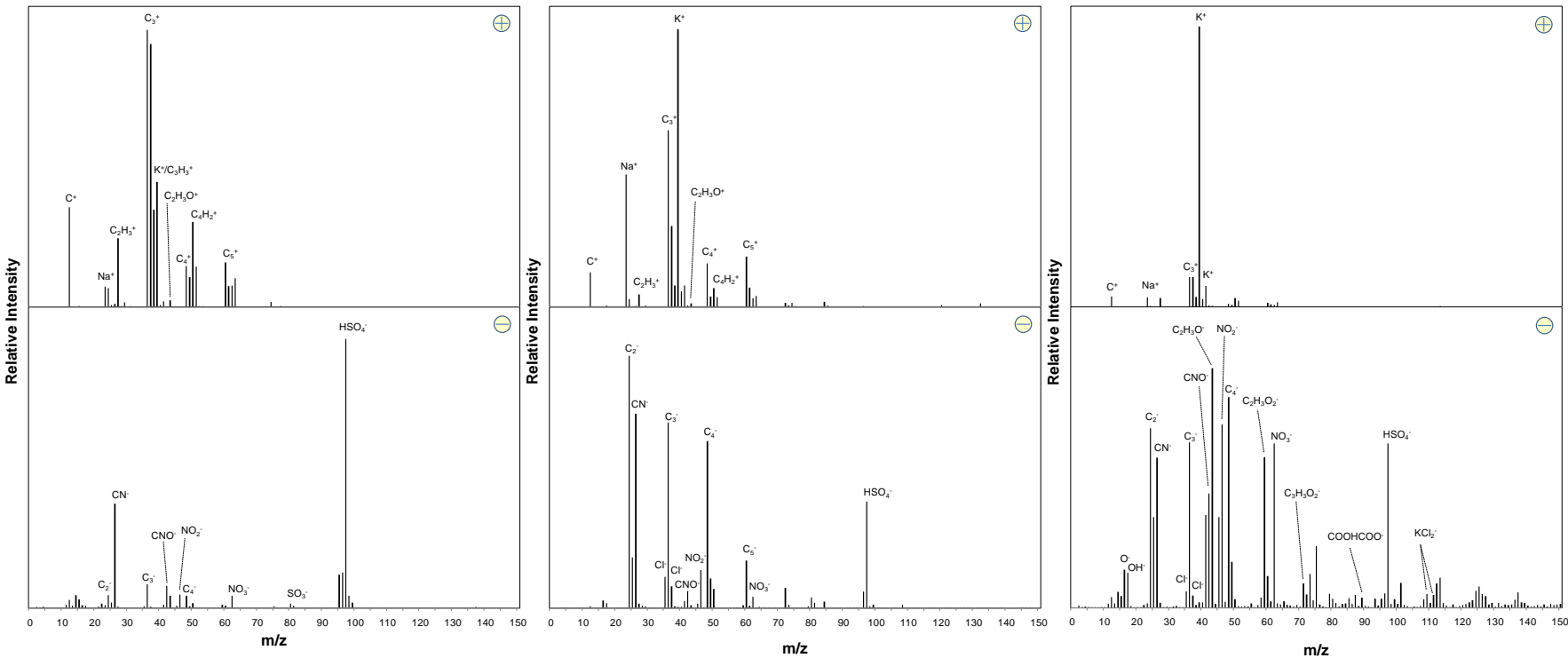
Current research activities of the Partner

- Domestic solid fuel burning

Coal

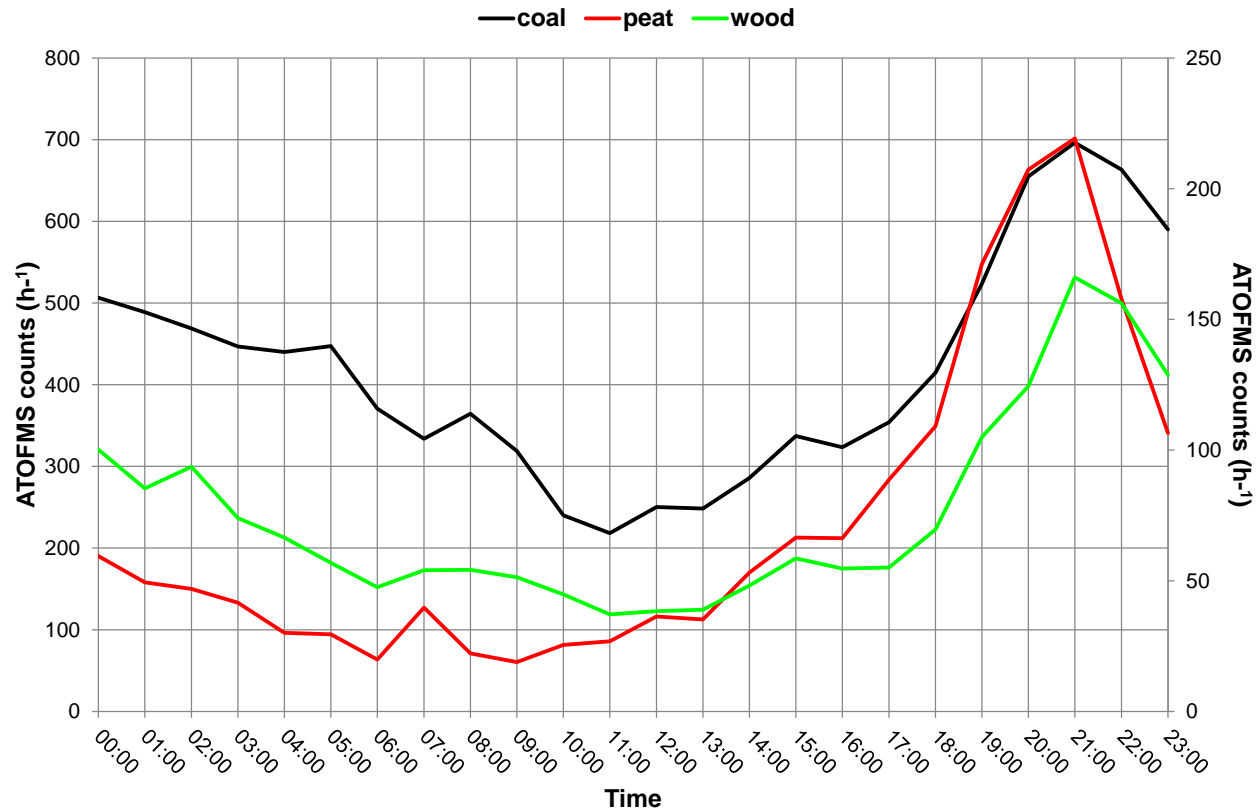
Peat

Wood



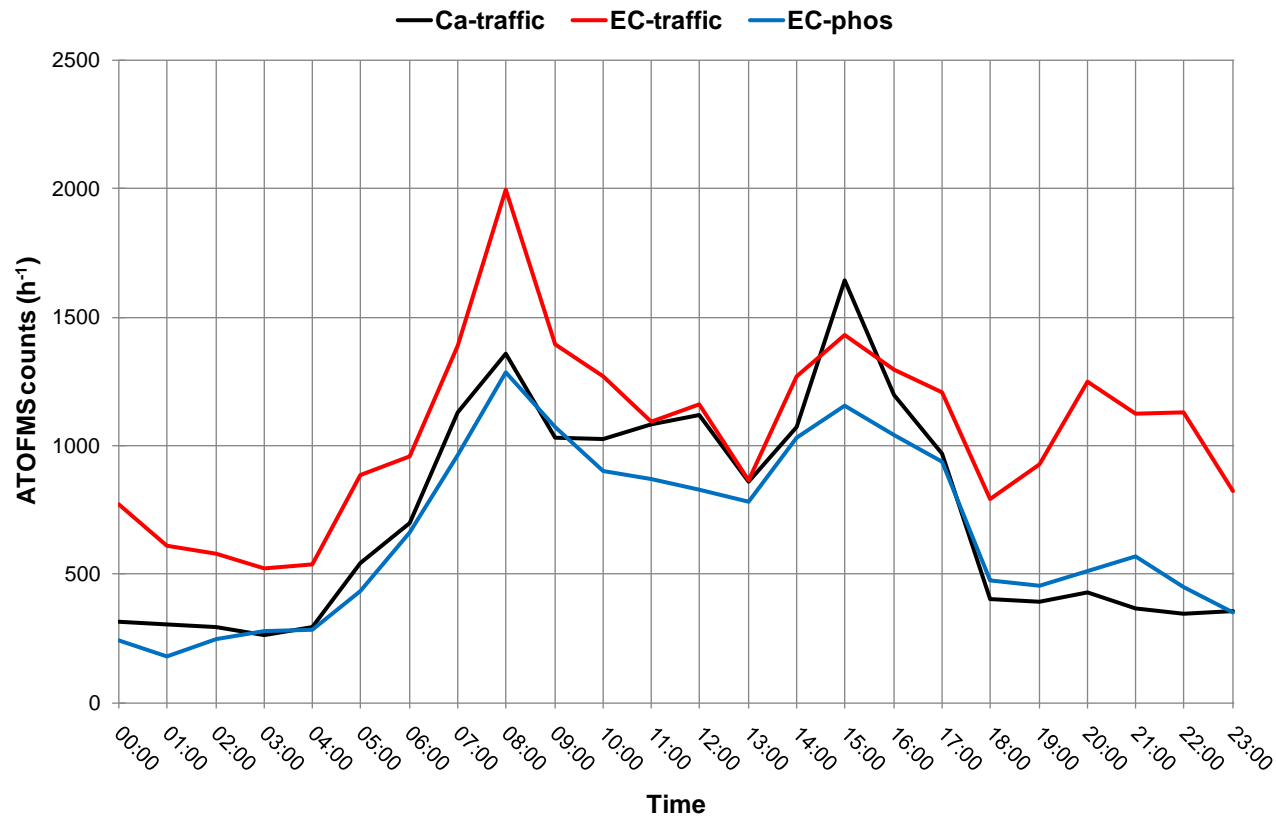
Current research activities of the Partner

- Temporal variation of sources



Current research activities of the Partner

- **Temporal variation of sources**



Current research activities of the Partner

- Source apportionment of PM_{2.5}

	Traffic	Domestic Combustion	Various Combustion	Marine	Long-range	Shipping
<i>Quantitative measurements:</i>						
OC mass	21	21	16	20	18	4
EC mass	43	20	18	5	11	4
Sulfate mass	9	11	40	23	15	2
Particle number (SMPS)	42	14	13	6	7	18
PM_{2.5} mass	23	5	11	14	13	1
<i>ATOFMS classes:</i>						
Coal	5	52	30	3	7	3
Peat	3	84	5	2	3	2
Wood	11	63	5	13	6	1
Sea salt	1	0	2	86	10	1
Shipping	0	0	0	0	0	100
Ca-traffic	83	0	0	4	8	4
EC-traffic	59	25	6	1	3	6
EC-phos	82	9	3	0	6	0
EC-MSA	1	0	3	6	90	0
EC-domestic	0	91	0	0	2	7
EC-background	28	18	35	1	11	6
EC-oil	52	24	24	1	0	0
ECOC	0	0	69	0	31	0
Oligomer	0	76	8	15	0	1

Research Facilities available for the Partner

- **Mobile laboratory:**
van, trailer & container equipped with:
 - ATOFMS
 - Particle size and number
(SMPS 10-700 nm, OPC 0.3-10 μm)
 - Elemental/Organic carbon (EC/OC)
 - Particle mass concentration (TEOM)
 - Standard NO_x , O_3 analyzers
 - Meteorological parameters



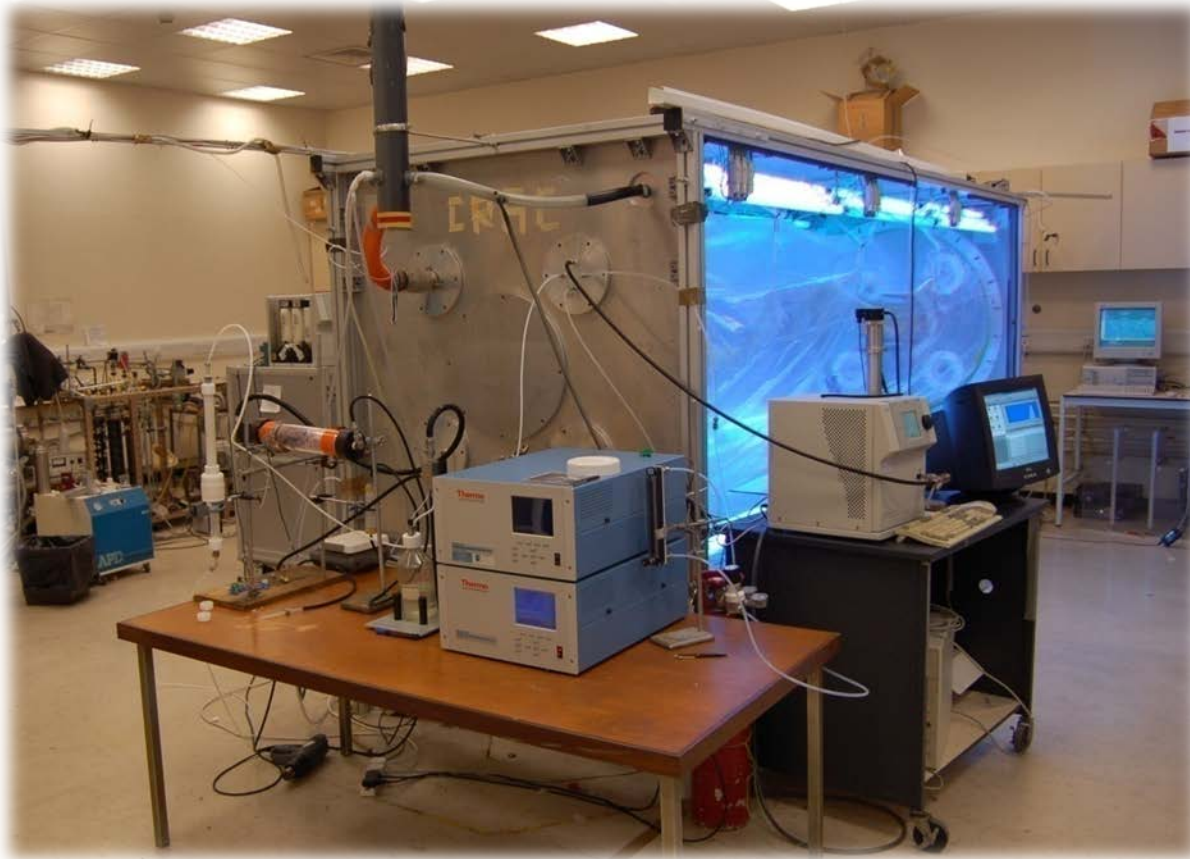


Research Facilities available for the Partner

- **New Atmospheric monitoring station on UCC campus:**
 - Particle size and number
(SMPS 10-700 nm, OPC 0.3-10 μm)
 - Particle mass concentration (TEOM)
 - Standard NO_x , O_3 analyzers
 - Meteorological parameters

Research Facilities available for the Partner

- Atmospheric Simulation Chamber:



- FEP- Teflon foil
- Volume of 3.91 m³

- Atmospheric Pressure
- Variable RH

- NO_x, O₃ analyzers
- Particle Sizers

Suggested **R&I Needs** for future research

- **Research directions as R&I NEEDS:**

Deployment of air quality sensors (commercially available or provided by partners in the EuNetAir consortium) alongside a range of conventional analyzers as part of 3 projects.

- A newly funded Irish EPA project called SAPPHIRE which focuses on air quality measurements in Irish towns with high levels of coal/peat/wood burning (start April 2014).
- A recently established atmospheric monitoring station on the UCC campus, which is also going to be part of the EPA's national air quality network (current)
- Deployment of multiple sensors in wireless air quality networks in urban areas of Cork and Dublin (proposed start January 2015).