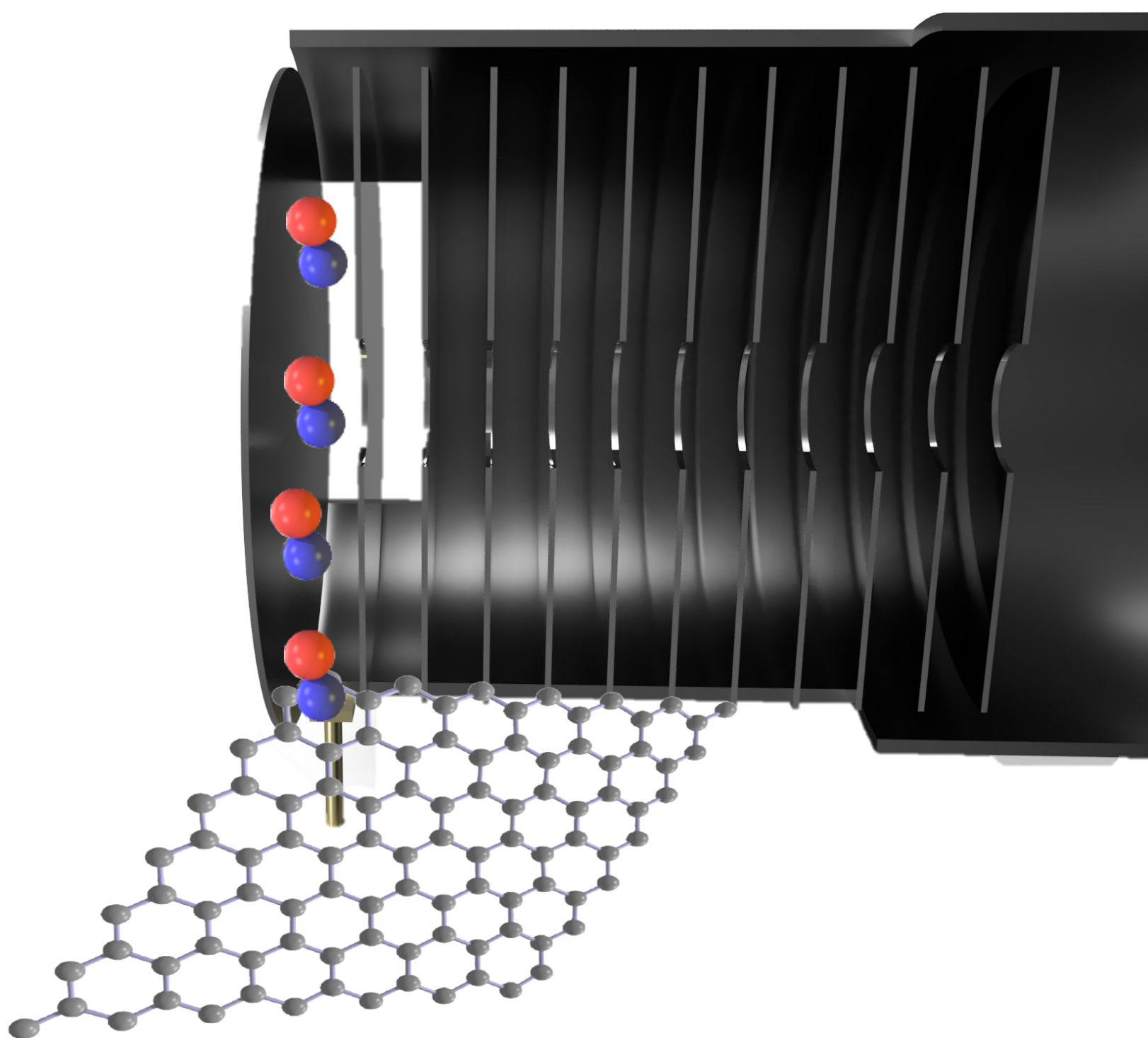


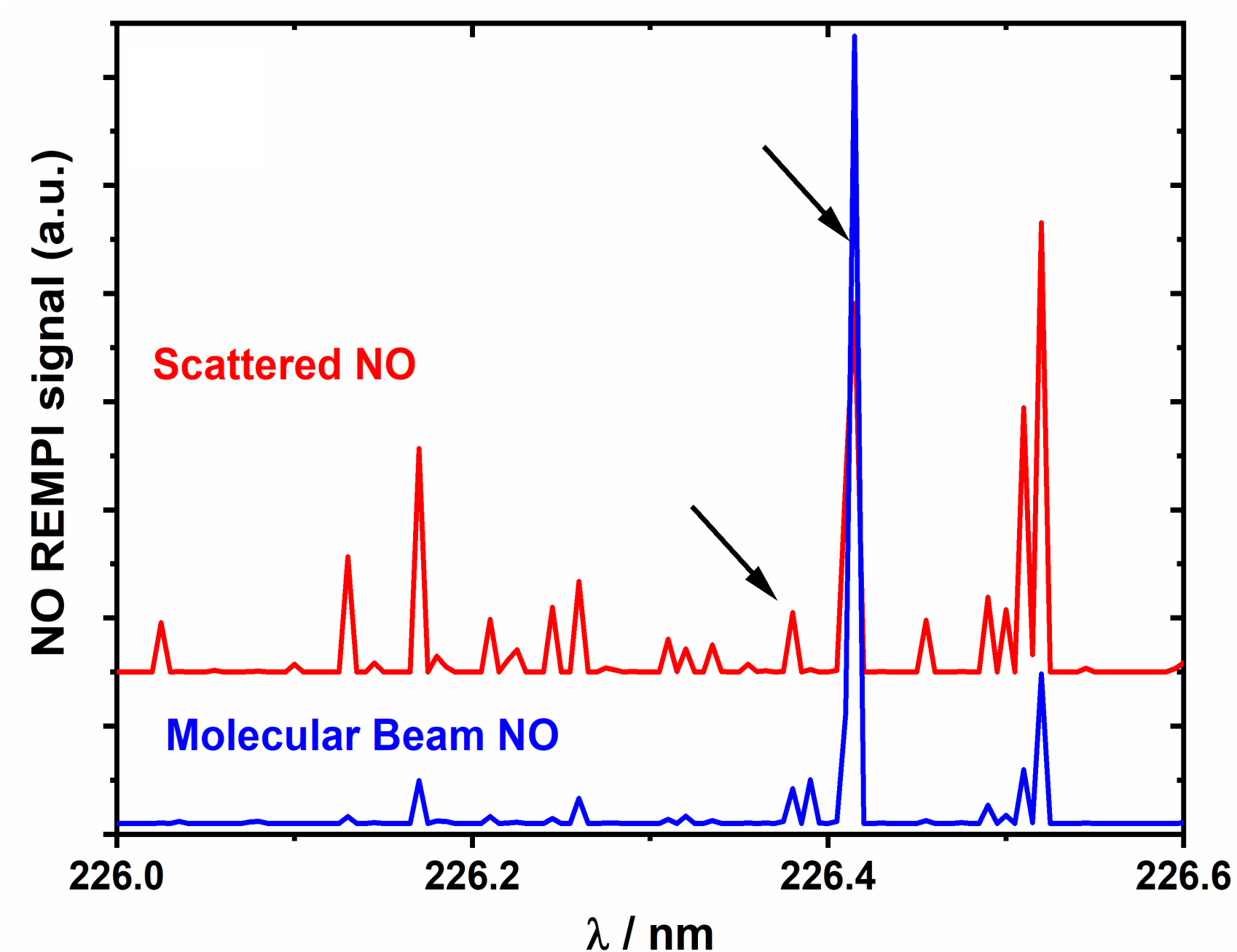
## 1 – Introduction

A molecular beam of NO seeded in helium (2%) was scattered off a graphene surface supported on gold. The NO in the beam and scattered NO was ionised using a 1+1 REMPI scheme and accelerated using charged VMI plates towards an MCP/Phosphor Screen detector. Supporting molecular dynamics simulations were carried out in DL\_POLY.



## 2 – REMPI

- NO ionised at 226.385 and 226.41 nm /  $Q_1(0)$  and  $R_1(0)$
- Full rotational analysis yet to be carried out but only minimal energy transfer is observed into rotational excitation after collision with the graphene

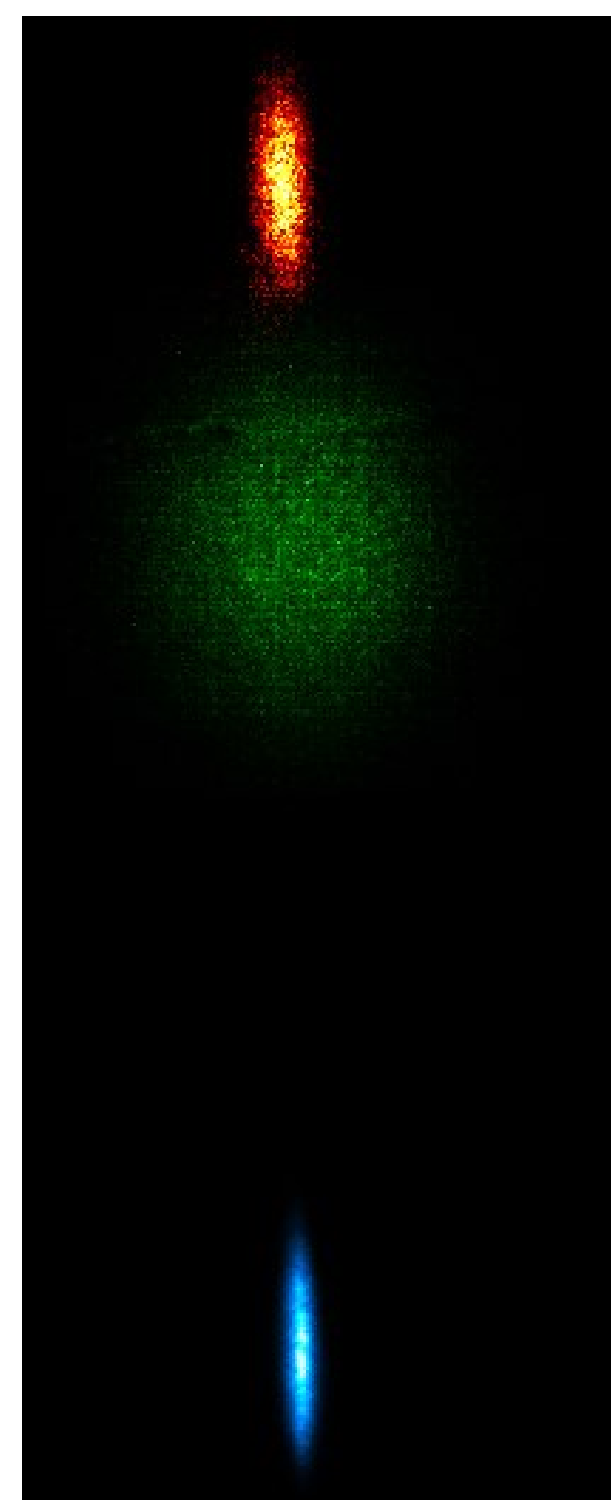


# Nitric Oxide Scattering off Graphene using Surface-Velocity Map Imaging

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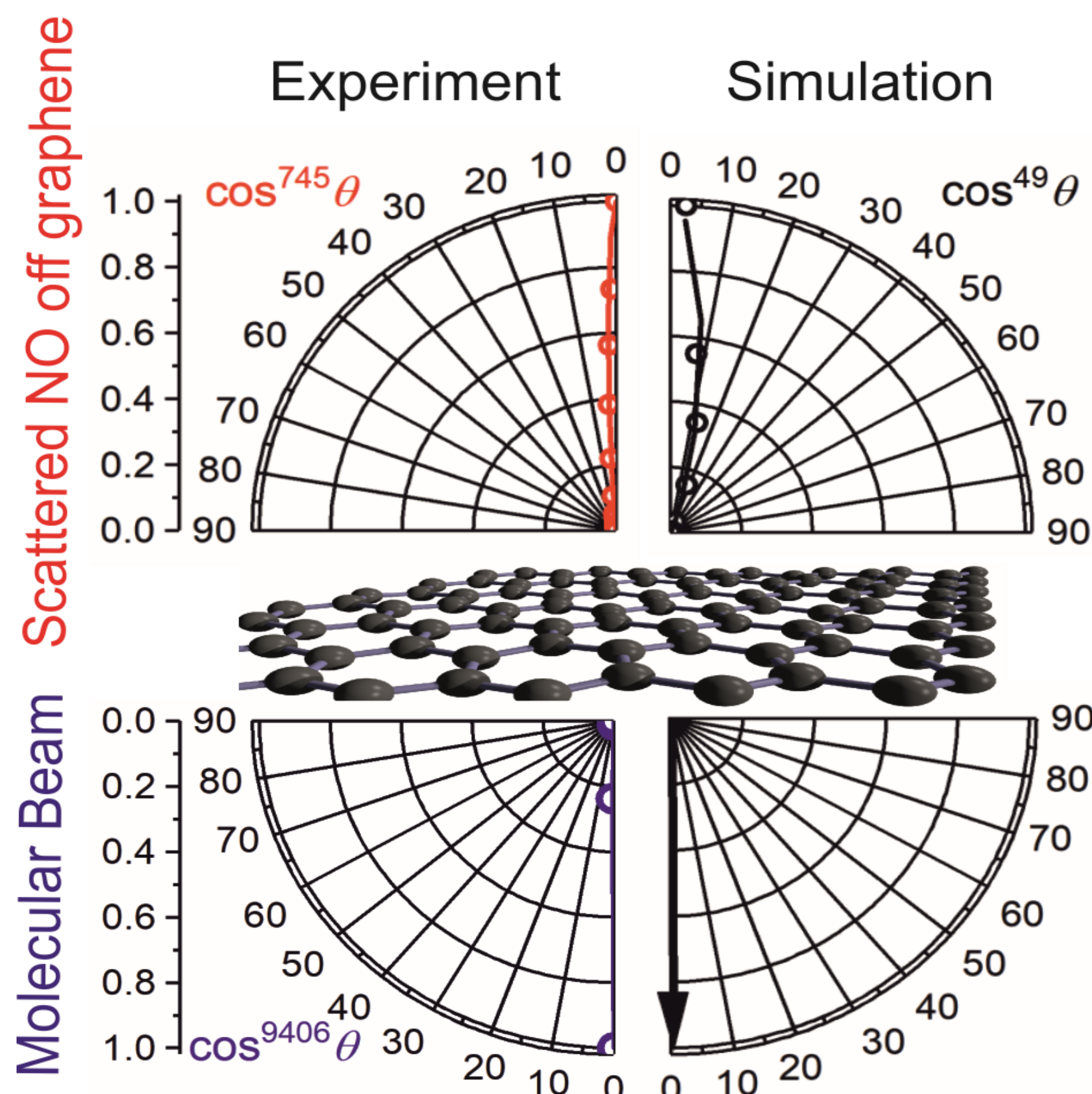
Department of Natural Sciences, Manchester Metropolitan University, M1 5GD, UK

## 3 – Velocity Map Images



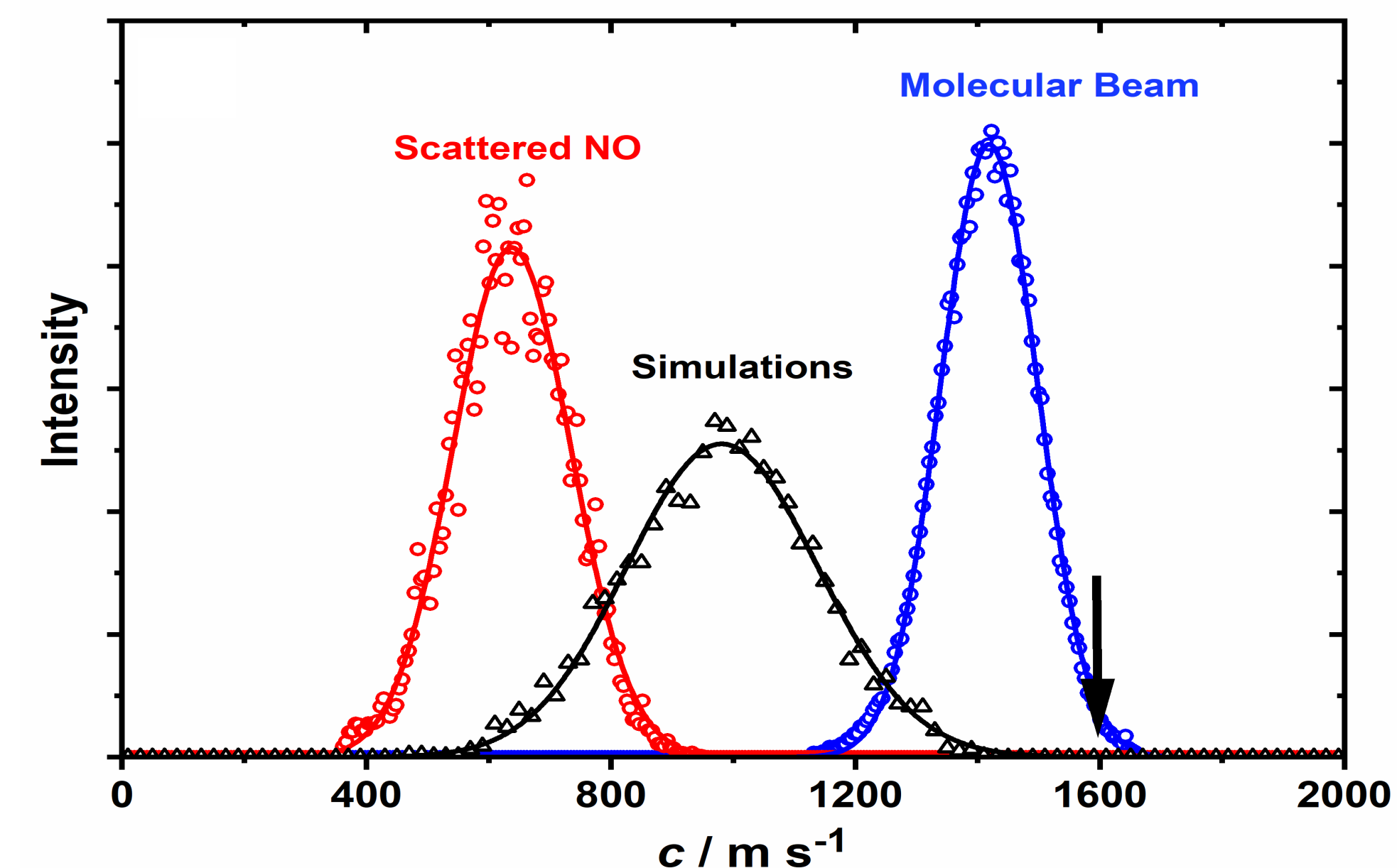
- Scattered NO with *upward* trajectory
- Background NO with zero velocity
- NO in the molecular beam with *downward* velocity
- Narrower velocity distribution for the molecular beam

## 5 – Polar Angle Distribution



## 4 – Velocity Distribution

- Molecular beam NO kinetic energy reduced by 80% from 0.31 eV to 0.06 eV
- Scattered NO in the MD simulations had a less dramatic reduction in kinetic energy reducing by 60% from 0.4 eV to 0.15 eV
- Large separation of gold and graphene (3.4 Å) could act as a worn out trampoline with the surface absorbing most of the energy



- Data points for polar angle scattering fitted to  $\cos^n \theta$  where thermal desorption would yield  $n = 1$
- Shallower polar angle in experiment than MD simulations yet both extremely narrow
- Suggests lack of thermal desorption despite large reduction in kinetic energy
- Dominant process is direct scattering close to the surface normal with most of the energy transferred to graphene phonons