Supplementary Information for: Topological magnetism in diluted artificial adatom lattices

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System	Magnetic moment (μ_B)	$J_{1(\text{adatom-Adatom})}$ (meV)	Magnetic anisotropy	Magnetic Topology
Cr (A)	2.9	-5.1	Biaxial	No
Cr (B)	3.0	-0.35	Biaxial	No
Mn (A)	3.2	1.98	Uniaxial	Yes
Mn (B)	3.2	-0.43	Biaxial	No
Fe (A)	2.3	4.77	Biaxial	No
Fe (B)	2.2	-0.12	Biaxial	No

Supplementary Table 1: Comparison of the magnetic properties of Cr, Mn, and Fe adatoms on the Nb(110) surface for lattice types A and B. The table presents the magnetic moments in μ_B, the first nearest-neighbor exchange interaction $J_{1(adatom-adatom)}$ in meV, and the magnetocrystalline anisotropy, specifying whether the anisotropy is uniaxial or biaxial. The last column indicates whether the system exhibits topological magnetism.

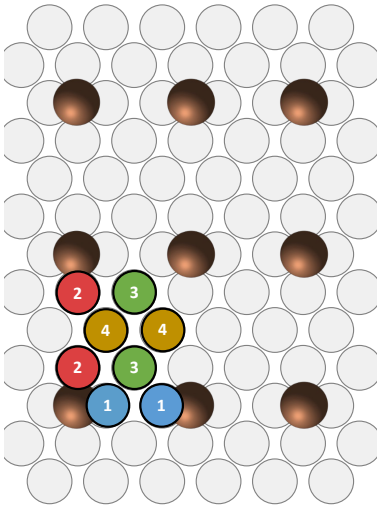
MAEs (meV)	Cr (A)	Cr (B)	Mn (A)	Mn (B)	Fe (A)	Fe (B)
$K_{zz} - K_{xx}$	-0.31	-0.49	0.1	-0.06	0.32	1.28
$K_{zz} - K_{yy}$	-0.15	-0.21	0.1	0.18	-0.12	0.7
MAE type	Biaxial	Biaxial	Uniaxial	Biaxial	Biaxial	Biaxial
Easy axis	x	x	$-$	x	y	z
Hard axis	z	z	$-$	y	x	x

Supplementary Table 2: Tensor elements associated to the magnetocrystalline anisotropy energies for the different adatoms lattices, and the corresponding anisotropy types for the different adatom lattices. The easy and hard axes indicate the preferred and least favorable directions of spin alignment, respectively.

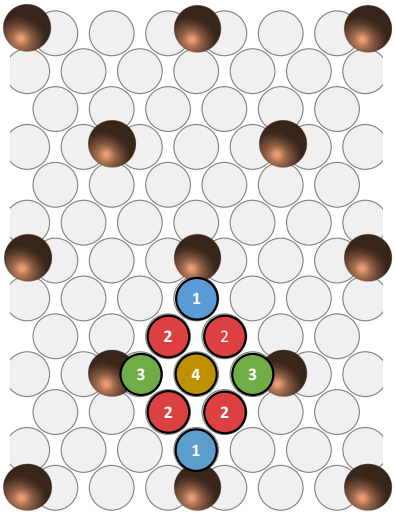
a

Nb atom #	Cr (A)	Cr (B)	Mn (A)	Mn (B)	Fe (A)	Fe (B)
1	0.18	0.08	-0.23	-0.06	0.16	0.03
2	0.07	0.01	0.04	0.001	0.02	0.00
3	0.01	0.19	0.01	-0.23	0.02	0.17
4	0.00	0.07	-0.01	0.05	0.00	0.01

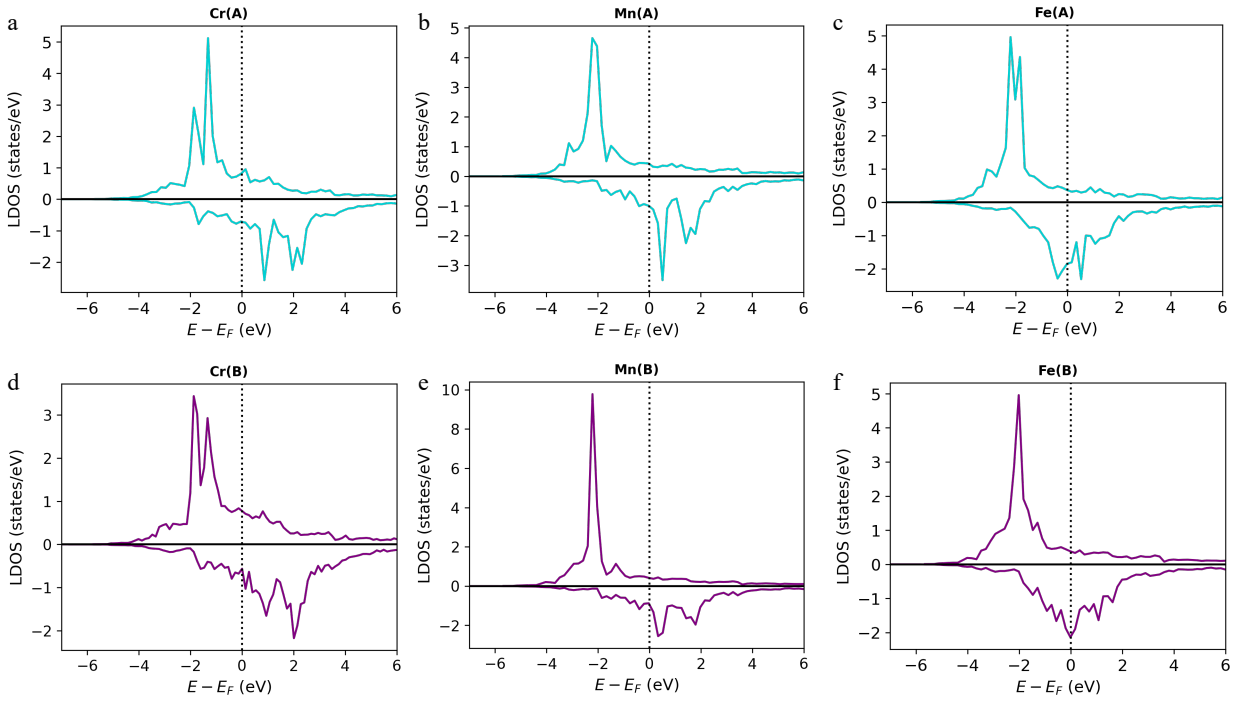
b



c



Supplementary Figure 1: Induced magnetic moments on Nb atoms due to Cr, Mn, and Fe adatoms on the Nb(110) surface. a Table showing the induced magnetic moments (in μ_B) on the nearest Nb atoms for different adatoms positioned in lattice A and B configurations. **b, c** Schematic illustrations of the Nb atoms listed in the table, highlighting their positions relative to the adatoms in the two lattice configurations.



Supplementary Figure 2: Electronic structure of the adatoms positioned on the Nb(110) surface. Spin-resolved local density of states (LDOS) of Cr, Mn, and Fe. Cyan and purple colors correspond to different lattice types, with the top row **(a–c)** representing lattice (A) and the bottom row **(d–f)** representing lattice (B)