Supplement of

## MULTICHARME: A Chernin-type multi-pass cell designed for IR and THz long-path absorption measurements in the CHARME atmospheric simulation chamber.

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Figure S1. The 9 different ports of CHARME. Ports with letter (A) correspond to DN 450, (B) to DN 350 and (C) to DN 200.MULTICHARME was adapted to ports A1 and A2.



**Figure S2.** Field and objective mirrors of MULTICHARME with their mounts designed by the Anhui Institute of Optical and Fine Mechanics of Heifei, China



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**Figure S3.** Arduino home-made control box connected to the 18 MULTICHARME actuators driving the field and objective mirror positions.



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**Figure S4.** Different matrix arrangements of the He-Ne spots on the field mirrors of MULTICHARME. From left to right: 120 m (3 rows × 4 columns); 240 m (3 rows × 8 columns); 360 m (6 rows × 6 columns); 540 m (8 rows × 6 columns).