## Two-dimensional electronic structure for high thermoelectric performance in halide perovskite Cs<sub>2</sub>Au(I)Au(III)I<sub>6</sub>

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**Fig.S1** Out-of-plane electrical transport coefficients for *p*-type  $Cs_2Au(I)Au(III)I_6$  as functions of temperature and hole concentration, (a) electrical conductivity, (b) Seebeck coefficient and (c) power factor.



**Fig.S2** Out-of-plane electrical transport coefficients for *n*-type  $Cs_2Au(I)Au(III)I_6$  as functions of temperature and electron concentration, (a) electrical conductivity, (b) Seebeck coefficient and (c) power factor.



**Fig.S3** (a) In-plane and (b) out-of-plane electrical thermal conductivity as functions of temperature and carrier concentration for *p*-type  $Cs_2Au(I)Au(III)I_6$ .



**Fig.S4** (a) In-plane and (b) out-of-plane electrical thermal conductivity as functions of temperature and carrier concentration for *n*-type  $Cs_2Au(I)Au(III)I_6$ .



Fig.S5 Phonon dispersion of Cs<sub>2</sub>Au(I)Au(III)I<sub>6</sub>.