Supporting information: “Angle Independent Polariton Emission Lifetime Shown by Perylene Hybridized to the Vacuum-Field Inside a Fabry-Pérot Cavity”

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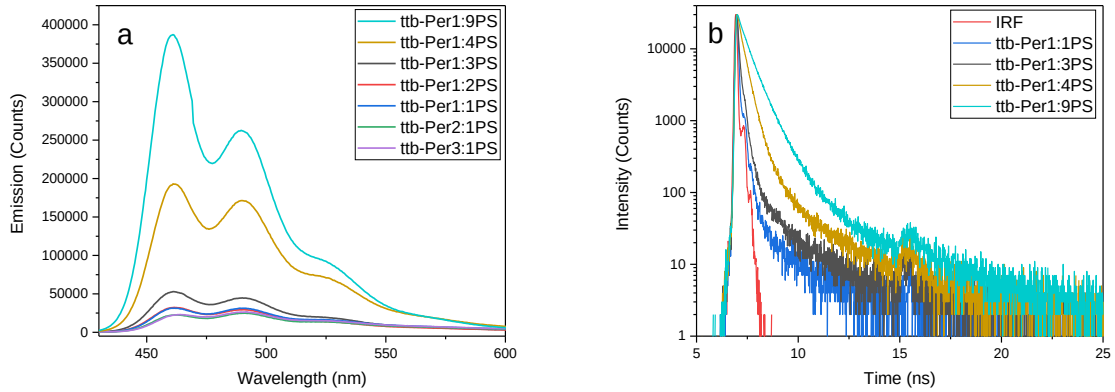

Figure S1. a) Emission spectra and b) emission lifetime decays of tetra-*tert*-butyl perylene (ttb-Per) in a polystyrene (PS) with varying mass ratios.

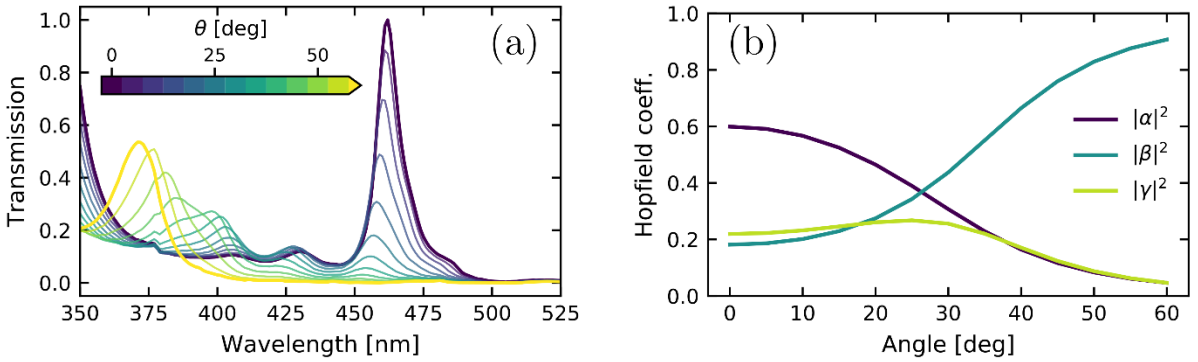

Figure S2. a) Angle resolved transmission spectrum of cavity **c**. (b) Corresponding Hopfield coefficients resulting from data fitting from equation 2, where $|\alpha|^2$, $|\beta|^2$, and $|\gamma|^2$.are the photonic and two excitonic contributions, respectively.

Table S1. Quality factors and linewidths of the used cavities, fitted (using equation 2) energy of the cavity mode (E_0), first ($\hbar\Omega_1$) and second ($\hbar\Omega_2$) Rabi splitting for the three tuned cavities having a photonic contribution of 0.19 (a), 0.32 (b) and 0.60 (c).

Cavity	Q	FWHM (meV)	E_0 (eV)	$\hbar\Omega_1$ (meV)	$\hbar\Omega_2$ (meV)
a	46±5	70±6	3.02±0.02	240±10	170±10
b	45±5	70±6	2.92±0.05	220±23	180±23
c	48±5	61±6	2.78±0.02	210±15	188±15

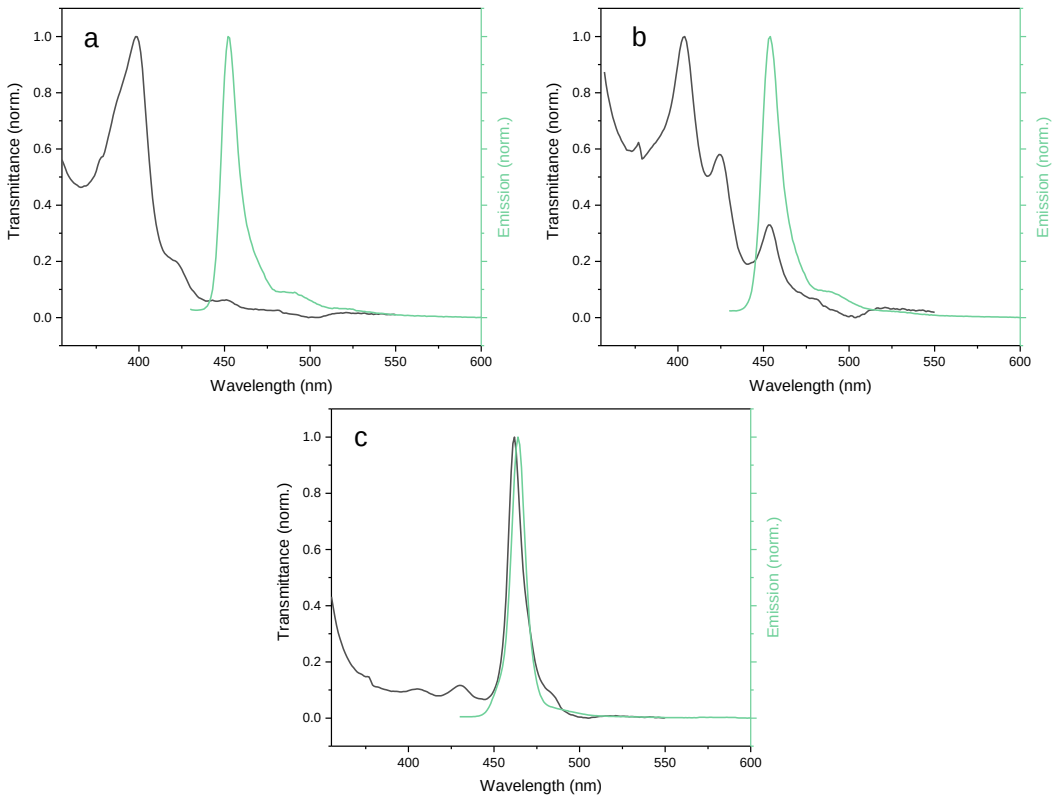

Figure S3. Normalized transmittance and emission spectra of the three (**a**, **b** and **c**) cavities at an angle of 0 degree.

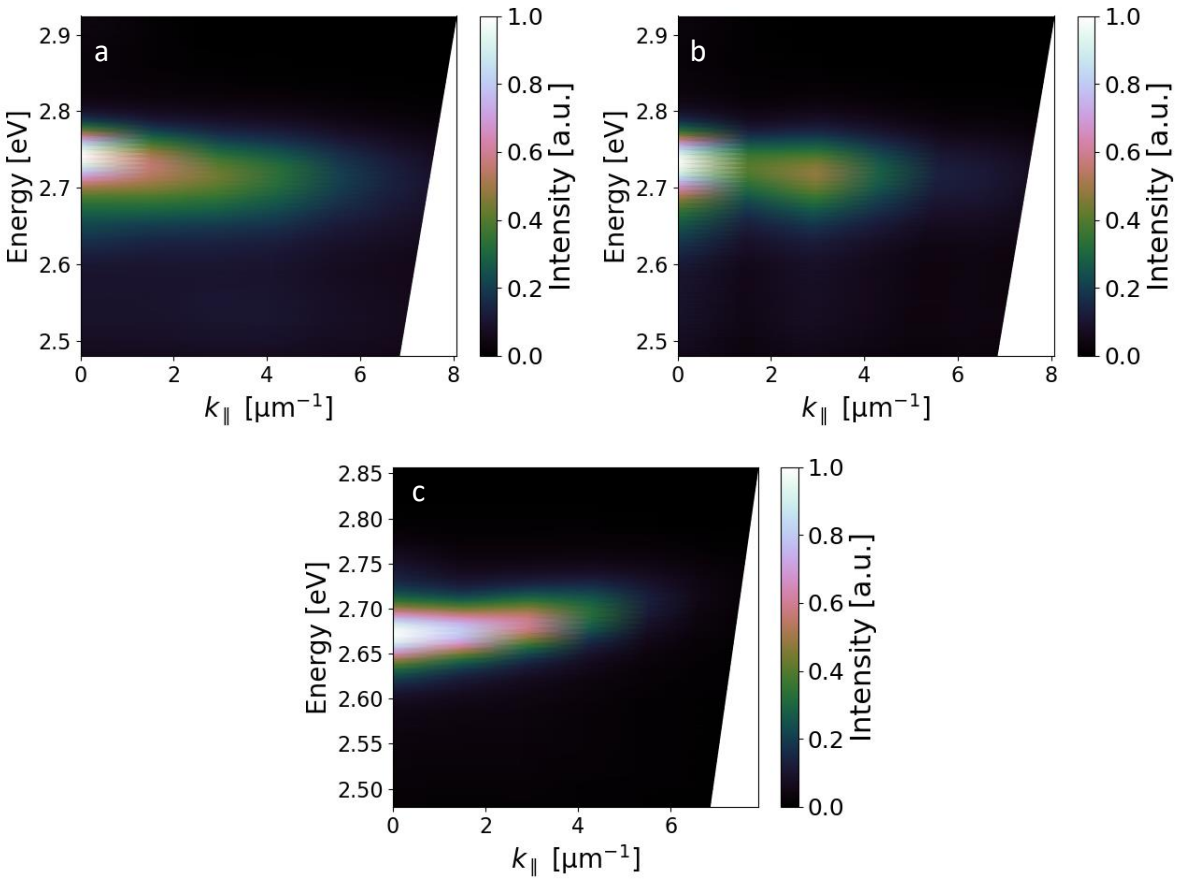

Figure S4. 2D emission plot for the three differently tuned cavities (**a**, **b** and **c**).

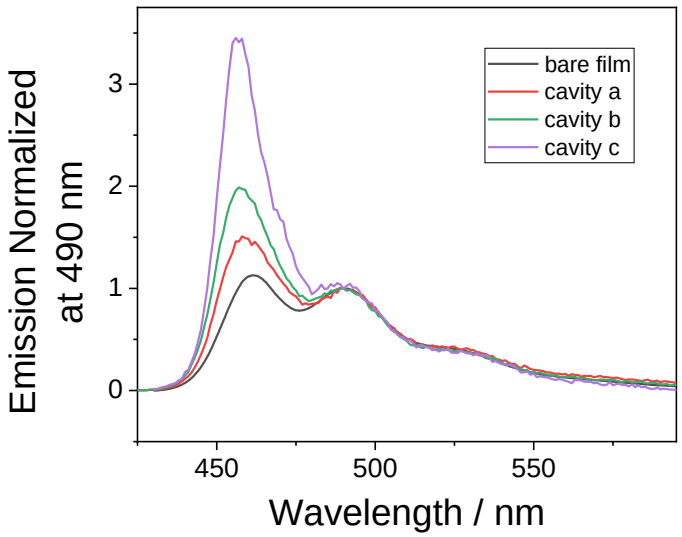

Figure S5. Normalized emission of cavities **a-c** taken at an incidence angle of 60°, and the emission from a bare film of ttb-perylene.

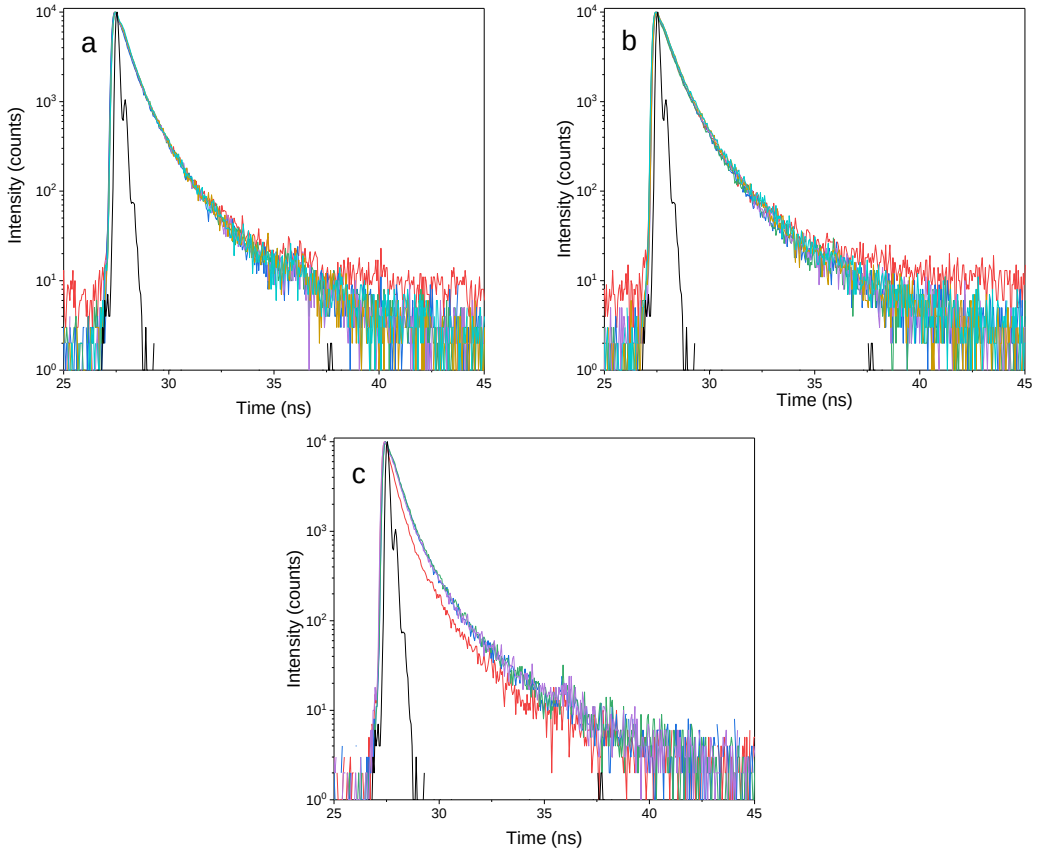

Figure S6. Emission lifetime traces of tetra-tert-butyl perylene loaded cavities (a-c) measured at different angles between 10 and 60 degree for the emission at 490 nm and the internal machine response (black). The spectra show no changes for the lifetime within the same cavity at the different angles.

Table S2. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the polariton emission decay at 460 nm for cavity **a**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.334±0.003	0.26±0.004	0.064±0.003	0.83±0.012	0.35
20	0.317±0.003	0.28±0.004	0.069±0.003	0.84±0.012	0.38
30	0.317±0.003	0.27±0.004	0.077±0.003	0.82±0.010	0.38
40	0.314±0.003	0.28±0.004	0.075±0.003	0.83±0.011	0.39
50	0.310±0.003	0.30±0.005	0.068±0.003	0.86±0.012	0.40
60	0.320±0.003	0.30±0.005	0.061±0.003	0.86±0.015	0.39

Table S3. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the exciton emission decay at 490 nm for cavity **a**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.295±0.002	0.44±0.005	0.039±0.002	1.47±0.022	0.56
20	0.294±0.002	0.39±0.004	0.054±0.002	1.27±0.014	0.53
30	0.293±0.002	0.42±0.005	0.048±0.002	1.32±0.017	0.55
40	0.294±0.002	0.41±0.005	0.050±0.002	1.30±0.016	0.54
50	0.299±0.002	0.44±0.004	0.041±0.002	1.41±0.019	0.56
60	0.310±0.002	0.44±0.004	0.039±0.001	1.42±0.019	0.55

Table S4. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the polariton emission decay at 460 nm for cavity **b**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.320±0.003	0.29±0.005	0.073±0.003	0.92±0.011	0.41
20	0.316±0.003	0.33±0.005	0.071±0.003	0.94±0.013	0.44
30	0.309±0.003	0.36±0.006	0.063±0.003	0.98±0.015	0.47
40	0.317±0.003	0.36±0.005	0.059±0.003	1.02±0.015	0.46
50	0.313±0.003	0.38±0.005	0.055±0.003	1.05±0.017	0.48
60	0.315±0.003	0.39±0.006	0.055±0.003	1.06±0.017	0.49

Table S5. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the exciton emission decay at 490 nm for cavity **b**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.300±0.002	0.46±0.005	0.051±0.002	1.45±0.020	0.60
20	0.295±0.002	0.47±0.005	0.047±0.002	1.44±0.019	0.60
30	0.292±0.002	0.47±0.005	0.048±0.002	1.46±0.019	0.61
40	0.291±0.002	0.49±0.006	0.047±0.002	1.49±0.020	0.63
50	0.295±0.002	0.50±0.005	0.046±0.002	1.53±0.019	0.64
60	0.301±0.002	0.55±0.005	0.035±0.001	1.71±0.025	0.67

Table S6. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the polariton emission decay at 460 nm for cavity **c**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.361±0.002	0.36±0.003	0.021±0.001	1.33±0.026	0.41
20	0.353±0.003	0.33±0.004	0.049±0.003	0.93±0.016	0.40
30	0.356±0.003	0.33±0.004	0.047±0.003	0.94±0.017	0.40
40	0.352±0.003	0.33±0.004	0.046±0.003	0.93±0.017	0.40
50	0.363±0.002	0.36±0.004	0.029±0.002	1.07±0.023	0.41
60	0.385±0.002	0.36±0.003	0.025±0.002	1.11±0.025	0.41

Table S7. Pre-exponential factors (B), lifetimes (τ) and calculated average lifetime (Average τ) obtained from the reconvolution fittings of the exciton emission decay at 490 nm for cavity **c**. Errors are given as one standard deviation.

Angle (deg)	B_1	τ_1 (ns)	B_2	τ_2 (ns)	Average τ (ns)
10	0.357±0.003	0.26±0.003	0.028±0.001	1.25±0.016	0.33
20	0.334±0.002	0.43±0.004	0.031±0.001	1.53±0.022	0.52
30	0.336±0.002	0.43±0.004	0.035±0.001	1.49±0.020	0.53
40	0.338±0.002	0.44±0.004	0.029±0.001	1.59±0.023	0.53

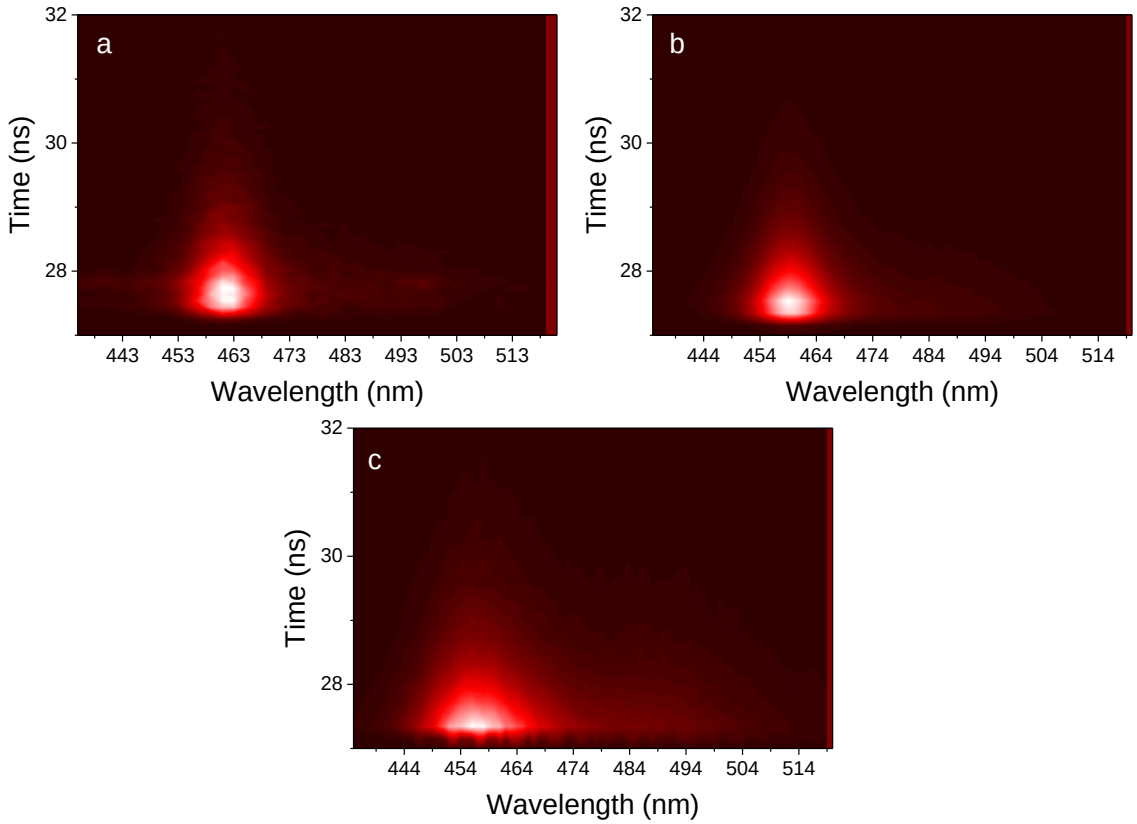

Figure S7. 2D time resolved emission spectra (TRES) maps of cavity **c** at the angle of a) 0 degree, b) 20 degrees and c) 50 degrees.

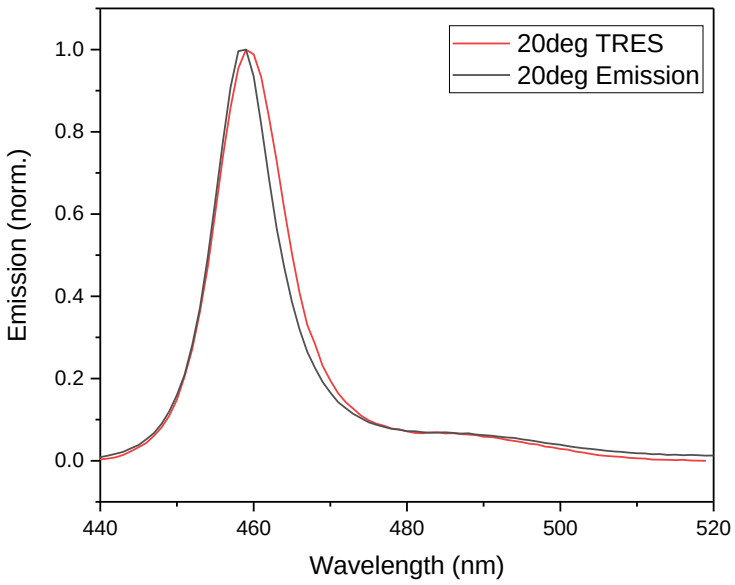

Figure S8. Comparison of the integrated time-resolved emission spectra (red) and the emission measurement of the **c** cavity (black) at the angle of 20 degrees.