

# HEAT KERNEL AND PARABOLIC HARNACK INEQUALITIES FOR SYMMETRIC DIRICHLET FORMS

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We consider the following symmetric Dirichlet forms on metric measure space  $(M, d, \mu)$ :

$$\mathcal{E}(f, g) = \mathcal{E}_c(f, g) + \iint_{M \times M} (f(x) - f(y))(g(x) - g(y)) J(dx, dy),$$

where  $\mathcal{E}_c$  is a strongly local symmetric bilinear form and  $J(dx, dy)$  is a symmetric Random measure on  $M \times M$ . Under general volume doubling condition on  $(M, d, \mu)$  and some mild assumptions on scaling functions, we establish stability results for upper bounds of heat kernel (resp. two-sided heat kernel estimates) in terms of the jumping kernels, the generalized capacity inequalities, and the Faber-Krahn inequalities (resp. the Poincaré inequalities). We also obtain characterizations of the associated parabolic Harnack inequalities.

## REFERENCES

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