

## IMPROVED FRACTIONAL HARDY INEQUALITIES FOR DUNKL GRADIENT

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**Abstract.** We prove an improved fractional Hardy inequality in the Dunkl setting for the weighted space  $L^p(\mathbb{R}^N, d\mu_k(x))$ . Also we prove a similar inequality for half-space.

**Mathematics subject classification (2010):** Primary 42B35; Secondary 42B37.

**Keywords and phrases:** Fractional Hardy inequality, Dunkl Laplacian, fractional Sobolev spaces, improved Hardy inequality.

### REFERENCES

- [1] B. ABDELLAOUI AND R. BENTIFOUR, *Caffarelli-Kohn-Nirenberg type inequalities of fractional order with applications*, J. Funct. Anal., **10**, 272 (2017), 3998–4029.
- [2] B. ABDELLAOUI AND F. MAHMOUDI, *An improved Hardy inequality for a nonlocal operator*, Discrete Contin. Dyn. Syst., **3**, 36 (2016), 1143–1157.
- [3] B. ABDELLAOUI, I. PERAL AND A. PRIMO, *A remark on the fractional Hardy inequality with a remainder term*, C. R. Math. Acad. Sci. Paris, **4**, 352 (2014), 299–303.
- [4] V. P. ANOOP AND S. PARUI, *Hardy inequality and fractional Hardy inequality for Dunkl gradient*, Isr. J. Math. **236** (2020), 247–278.
- [5] C. F. DUNKL, *Differential-difference operators associated to reflection groups*, Trans. Amer. Math. Soc., **1**, 311 (1989), 167–183.
- [6] R. FRANK, E. LIEB AND R. SEIRINGER, *Hardy-Lieb-Thirring Inequalities for Fractional Schrödinger Operators*, J. Amer. Math. Soc., **21** (2008), 925–950.
- [7] R. FRANK AND R. SEIRINGER, *Non-linear ground state representations and sharp Hardy inequalities*, J. Funct. Anal., **12**, 255 (2008), 3407–3430.
- [8] R. FRANK AND R. SEIRINGER, *Sharp Fractional Hardy Inequalities in Half-Spaces*, International Mathematical Series, **11**, Springer, New York, NY, 2010.
- [9] D. V. GORBACHEV, V. I. IVANOV AND S. YU. TIKHONOV, *Riesz Potential and maximal function for Dunkl transform*, Potential Analysis (2020), <https://doi.org/10.1007/s11118-020-09867-z>.
- [10] P. LINDQVIST, *On the equation  $\Delta_p u + \lambda |u|^{p-2}u = 0$* , Proc. Amer. Math. Soc. Sci. Paris, **1**, 109 (1990), 157–164, arXiv:1708.09733.
- [11] M. RÖSLER, *Dunkl operators: theory and applications*, in *Orthogonal Polynomials and Special Functions*, Lecture Notes in Math. Sci. Paris, **1817**, Springer, Berlin, 2003.
- [12] S. THANGAVELU AND YUAN XU, *Convolution operator and maximal function for the Dunkl transform*, J. Anal. Math., **97** (2005), 25–55.
- [13] S. THANGAVELU AND YUAN XU, *Riesz transform and Riesz potentials for Dunkl transform*, J. Comput. Appl. Math., **1**, 199 (2007), 181–195.