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To whom it may concern

It's my pleasure to recommend Mr. **Jack Southgate**'s application for the postdoc position on Geometry of Materials, Packings and Rigid Frameworks at Brown University, ICERM.

My acquaintance with Jack began when he contacted me in May 2019 regarding a Masters project on Toric and Tropical Geometry. We decided that the project should include reading the background material with an eye towards understanding the Chow cohomology groups of toric varieties, and depending on the progress, considering some research problems on the topic.

Throughout his project, Jack demonstrated the ability to grasp complex concepts in Algebraic Geometry and Tropical Geometry, despite the time constraints. Jack never hesitated to work out the details, and he was very good at detecting the crux of the problems and theorems. He attended our meetings with prepared questions, well-aware of where he missed some details, and he did not feel satisfied until he has gained a hands-down understanding of the theorems. Due to this mathematical attitude, alongside his interest in long-distance running, it was evident to me that he would become a brilliant excellent PhD student.

Mr Southgate started his PhD under the supervision of Dr Louis Theran at the University of St Andrews in September 2020. I met Louis in the summer of 2023 who expressed his contentment with Jack's progress throughout his PhD. Jack intends to complete his PhD soon and has produced two interesting solo articles on Rigidity Theory. Jack research is mostly concerned with volume rigidity and rigidity of hypergraphs under different geometric constraints. In his first article, Jack studied the geometry of certain spaces associated to the volume measurement map to determine the non-genericity of global volume rigidity. Also, Jack has been using methods from Combinatorial Algebraic Geometry to study volume rigidity. While my expertise lies outside of Rigidity Theory, nevertheless, after a brief review of Jack's articles and witnessing his virtual presentation to my group in July 2023, I was impressed by the incorporation of diverse elements from Matroid Theory, Polytope Theory, and Combinatorial Algebraic Geometry in his article. Furthermore, Jack demonstrated a strong grasp of the algebro-geometric background relevant to his articles.

Jack's enthusiasm for expanding his expertise and research in Rigidity The-

ory and related subjects is evident, and Jack's mathematical background and problem-solving skills suit this position very well. Consequently, I strongly support Jack Southgate's application for this postdoc position.

Should you have any further questions please do not hesitate to contact me.

Sincerely yours,

Farhad Babaee

Assistant Professor in Pure Mathematics