

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Dissertation Committee, we certify that we have read the dissertation prepared by Andrew James Steinmetz, titled *Modern topics in relativistic spin dynamics and magnetism* and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.



Johann Rafelski Date: October 27th, 2023



John Rutherford Date: October 27th, 2023



Shufang Su Date: October 27th, 2023



Sean Fleming Date: October 27th, 2023



Stefan Meinel Date: October 27th, 2023

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.



Dissertation Director: Johann Rafelski Date: October 27th, 2023