Thermodynamics of frustrated Heisenberg magnets on the kagome and pyrochlore lattices: Green's function approach and high-temperature expansion
P. Müller\(^a\), J. Richter\(^a\) and O. Derzhko\(^b,c,d\)

\(^a\)Institute for Physics, Otto-von-Guericke-Universität, D-39016 Magdeburg, Germany
\(^b\)Institute for Condensed Matter Physics of the National Academy of Sciences of Ukraine, 1 Svientsitskii Str., 79011 Lviv, Ukraine
\(^c\)Department for Theoretical Physics, Ivan Franko National University of Lviv, 12 Drahomanov Str., 79005 Lviv, Ukraine
\(^d\)Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11, 34151 Trieste, Italy

Heisenberg models on highly frustrated lattices are in the focus of many theoretical studies. While there are numerous studies of the ground state of the kagome and pyrochlore lattices, much less is known about the thermodynamic properties. We use the spin-rotation invariant Green's function method [1–5] as well as the high-temperature expansion up to order 13 [6] to study the temperature dependence of the magnetic structure factor \(S_Q\), the uniform susceptibility \(\chi_0\), the specific heat \(C_V\), the correlation length \(\xi_Q\) and the correlation functions \(\langle S_0 S_R \rangle\) for \(S \geq 1/2\) of the Heisenberg antiferromagnet on the kagome [4] and pyrochlore [5] lattices as well as the Heisenberg ferromagnet [3] on the pyrochlore lattice for arbitrary spin quantum number \(S\).