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 研究課題名（和文） 高次元時空理論の実験的・観測的検証可能性の研究
 研究課題名（英文） Research on the possibility of experimentally/observationally verifying higher dimensional theory of spacetime
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研究成果の概要：

高次元時空理論に基づく宇宙論やブラックホール形成問題を詳しく解析し、それらがどのような実験ないしは観測によって検証可能かを研究した。その結果、宇宙論においては、宇宙曲率揺らぎの非ガウス性が重要であるという共通認識を得た。そこで、非ガウス性を一般的に取り扱う定式化を構築した。また、高次元ブラックホールに関しては、LHCにおけるブラックホール生成条件等に関するより定量的な評価を導出した。

交付額

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研究分野：数物系科学

科研費の分科・細目：物理学、素粒子・原子核・宇宙線・宇宙物理

キーワード：高次元時空、ブラックホール、インフレーション宇宙、暗黒エネルギー

1. 研究開始当初の背景

世界的に高次元時空理論の研究が盛んになされるようになると並行して、WMAP衛星の宇宙背景放射の非等方性観測に代表されるような宇宙論に関する制度の高い観測データが得られ始めている、という状況であった。

2. 研究の目的

世界に先駆けて高次元時空理論に立脚した宇宙論・相対論を系統的に展開し、その結果を従来の4次元宇宙論・相対論の予言と詳しく比較することによって、その一般的特徴についての理解を深め、有望なモデルの理論的

クラスを絞込み、それらの個々のモデル固有の性質や期待される現象を明らかにする。

3. 研究の方法

解析的な方法で求めた高次元宇宙論や高次元ブラックホールの解などを基礎に、それらの観測量への影響を解析的・数値的両面から評価し、それらの近い将来の観測計画での検証可能性を調べる。

4. 研究成果

研究成果は非常に多岐にわたるため、ここでは研究課題の主な成果のみについて簡単に

触れる。

(1)インフレーション宇宙における揺らぎに十分に観測可能な非ガウス性が含まれ得ることを示し、それが高次元時空理論への糸口となることを明らかにした。

(2)LHCに代表される加速器等において生成が期待されている高次元ブラックホールに関して、その性質や生成率に関するより定量的な評価を得た。

5. 主な発表論文等

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