


References


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### List of Symbols and Notations

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>$\Sigma, \Gamma, \Lambda$</td>
<td>Typical names for alphabets (finite and nonempty sets whose elements are viewed as symbols).</td>
</tr>
<tr>
<td>$\mathbb{C}^\Sigma$</td>
<td>The complex Euclidean space of functions from an alphabet $\Sigma$ to the complex numbers. (Equivalently, the complex Euclidean space of vectors having entries indexed by $\Sigma$.)</td>
</tr>
<tr>
<td>$\mathcal{W}, \mathcal{X}, \mathcal{Y}, \mathcal{Z}$</td>
<td>Typical names for complex Euclidean spaces.</td>
</tr>
<tr>
<td>$\langle u, v \rangle$</td>
<td>The inner product between vectors $u$ and $v$.</td>
</tr>
<tr>
<td>$|u|$</td>
<td>The Euclidean norm of a vector $u$.</td>
</tr>
<tr>
<td>$S(\mathcal{X})$</td>
<td>The unit sphere in a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$|u|_p$</td>
<td>The $p$-norm of a vector $u$.</td>
</tr>
<tr>
<td>$|u|_\infty$</td>
<td>The $\infty$-norm of a vector $u$.</td>
</tr>
<tr>
<td>$u \perp v, u \perp A$</td>
<td>Indicates that a vector $u$ is orthogonal to a vector $v$, or to every element of a set of vectors $A$.</td>
</tr>
<tr>
<td>$e_a$</td>
<td>An element of the vector standard basis, corresponding to a symbol (or index) $a$.</td>
</tr>
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### List of Symbols and Notations

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<thead>
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<tbody>
<tr>
<td>( \Sigma_1 \sqcup \cdots \sqcup \Sigma_n )</td>
<td>The disjoint union of alphabets ( \Sigma_1, \ldots, \Sigma_n ).</td>
<td>5</td>
</tr>
<tr>
<td>( \mathcal{X}_1 \oplus \cdots \oplus \mathcal{X}_n )</td>
<td>The direct sum of complex Euclidean spaces ( \mathcal{X}_1, \ldots, \mathcal{X}_n ).</td>
<td>5</td>
</tr>
<tr>
<td>( u_1 \oplus \cdots \oplus u_n )</td>
<td>The direct sum of vectors ( u_1, \ldots, u_n ).</td>
<td>5</td>
</tr>
<tr>
<td>( \mathcal{X}_1 \otimes \cdots \otimes \mathcal{X}_n )</td>
<td>The tensor product of complex Euclidean spaces ( \mathcal{X}_1, \ldots, \mathcal{X}_n ).</td>
<td>6</td>
</tr>
<tr>
<td>( u_1 \otimes \cdots \otimes u_n )</td>
<td>The tensor product of vectors ( u_1, \ldots, u_n ).</td>
<td>6</td>
</tr>
<tr>
<td>( \mathcal{X}^{\otimes n} )</td>
<td>The ( n )-fold tensor product of a complex Euclidean space ( \mathcal{X} ) with itself.</td>
<td>7</td>
</tr>
<tr>
<td>( u^{\otimes n} )</td>
<td>The ( n )-fold tensor product of a vector ( u ) with itself.</td>
<td>7</td>
</tr>
<tr>
<td>( \mathbb{R}^\Sigma )</td>
<td>The real Euclidean space of functions from an alphabet ( \Sigma ) to the real numbers. (Equivalently, the real Euclidean space of vectors having entries indexed by ( \Sigma ).)</td>
<td>7</td>
</tr>
<tr>
<td>( L(\mathcal{X}, \mathcal{Y}) )</td>
<td>Space of all linear operators mapping a complex Euclidean space ( \mathcal{X} ) to a complex Euclidean space ( \mathcal{Y} ).</td>
<td>7</td>
</tr>
<tr>
<td>( E_{a,b} )</td>
<td>An element of the operator standard basis, corresponding to symbols (or indices) ( a ) and ( b ).</td>
<td>9</td>
</tr>
<tr>
<td>( \overline{A}, \overline{u} )</td>
<td>The entry-wise complex conjugate of an operator ( A ) or a vector ( u ).</td>
<td>10</td>
</tr>
<tr>
<td>( A^\top, u^\top )</td>
<td>The transpose of an operator ( A ) or a vector ( u ).</td>
<td>10</td>
</tr>
<tr>
<td>( A^<em>, u^</em> )</td>
<td>The adjoint of an operator ( A ) or a vector ( u ).</td>
<td>10</td>
</tr>
<tr>
<td>( \ker(A) )</td>
<td>The kernel of an operator ( A ).</td>
<td>11</td>
</tr>
<tr>
<td>( \text{im}(A) )</td>
<td>The image of an operator ( A ).</td>
<td>11</td>
</tr>
<tr>
<td>( \text{rank}(A) )</td>
<td>The rank of an operator ( A ).</td>
<td>11</td>
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<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>$A_1 \otimes \cdots \otimes A_n$</td>
<td>The tensor product of operators $A_1, \ldots, A_n$.</td>
</tr>
<tr>
<td>$A^\otimes n$</td>
<td>The $n$-fold tensor product of an operator $A$ with itself.</td>
</tr>
<tr>
<td>$L(\mathcal{X})$</td>
<td>Space of linear operators mapping a complex Euclidean space $\mathcal{X}$ to itself.</td>
</tr>
<tr>
<td>$\mathbb{1}$</td>
<td>The identity operator; denoted $\mathbb{1}_\mathcal{X}$ when it is helpful to indicate that it acts on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$X^{-1}$</td>
<td>The inverse of an invertible square operator $X \in L(\mathcal{X})$.</td>
</tr>
<tr>
<td>$\text{Tr}(X)$</td>
<td>The trace of a square operator $X \in L(\mathcal{X})$.</td>
</tr>
<tr>
<td>$\langle A, B \rangle$</td>
<td>The inner product of operators $A$ and $B$.</td>
</tr>
<tr>
<td>$\text{Det}(X)$</td>
<td>The determinant of a square operator $X$.</td>
</tr>
<tr>
<td>$\text{Sym}(\Sigma)$</td>
<td>The set of permutations, or bijective functions, of the form $\pi : \Sigma \to \Sigma$.</td>
</tr>
<tr>
<td>$\text{sign}(\pi)$</td>
<td>The sign, or parity, of a permutation $\pi$.</td>
</tr>
<tr>
<td>$\text{spec}(X)$</td>
<td>The spectrum of a square operator $X$.</td>
</tr>
<tr>
<td>$[X, Y]$</td>
<td>The Lie bracket of square operators $X$ and $Y$.</td>
</tr>
<tr>
<td>$\text{comm}(\mathcal{A})$</td>
<td>The commutant of a set $\mathcal{A}$ of square operators.</td>
</tr>
<tr>
<td>$\text{Herm}(\mathcal{X})$</td>
<td>The set of Hermitian operators acting on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$\text{Pos}(\mathcal{X})$</td>
<td>The set of positive semidefinite operators acting on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$\text{Pd}(\mathcal{X})$</td>
<td>The set of positive definite operators acting on a complex Euclidean space $\mathcal{X}$.</td>
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<td>$D(\mathcal{X})$</td>
<td>The set of density operators acting on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$\text{Proj}(\mathcal{X})$</td>
<td>The set of projection operators acting on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$\Pi_\mathcal{V}$</td>
<td>The projection operator whose image is $\mathcal{V}$.</td>
</tr>
<tr>
<td>$U(\mathcal{X}, \mathcal{Y})$</td>
<td>The set of isometries mapping a complex Euclidean space $\mathcal{X}$ to a complex Euclidean space $\mathcal{Y}$.</td>
</tr>
<tr>
<td>$U(\mathcal{X})$</td>
<td>The set of unitary operators acting on a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>$\text{Diag}(u)$</td>
<td>The diagonal square operator whose diagonal entries are described by the vector $u$.</td>
</tr>
<tr>
<td>$\lambda(H)$</td>
<td>The vector of eigenvalues of a Hermitian operator $H$.</td>
</tr>
<tr>
<td>$\lambda_k(H)$</td>
<td>The $k$-th largest eigenvalue of a Hermitian operator $H$.</td>
</tr>
<tr>
<td>$X \geq Y$ or $Y \leq X$</td>
<td>Indicates that $X - Y$ is positive semidefinite, for Hermitian operators $X$ and $Y$.</td>
</tr>
<tr>
<td>$X &gt; Y$ or $Y &lt; X$</td>
<td>Indicates that $X - Y$ is positive definite, for Hermitian operators $X$ and $Y$.</td>
</tr>
<tr>
<td>$T(\mathcal{X}, \mathcal{Y})$</td>
<td>The space of linear maps from $L(\mathcal{X})$ to $L(\mathcal{Y})$, for complex Euclidean spaces $\mathcal{X}$ and $\mathcal{Y}$.</td>
</tr>
<tr>
<td>$\Phi^*$</td>
<td>The adjoint of a map $\Phi \in T(\mathcal{X}, \mathcal{Y})$.</td>
</tr>
<tr>
<td>$\Phi_1 \otimes \cdots \otimes \Phi_n$</td>
<td>The tensor product of maps $\Phi_1, \ldots, \Phi_n$.</td>
</tr>
<tr>
<td>$\Phi^\otimes n$</td>
<td>The $n$-fold tensor product of a map $\Phi$ with itself.</td>
</tr>
<tr>
<td>$1_{L(\mathcal{X})}$</td>
<td>The identity map acting on $L(\mathcal{X})$.</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tr$\mathcal{X}$</td>
<td>The partial trace over a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>CP($\mathcal{X}, \mathcal{Y}$)</td>
<td>The set of completely positive maps of the form $\Phi \in T(\mathcal{X}, \mathcal{Y})$.</td>
</tr>
<tr>
<td>vec($A$)</td>
<td>The vec mapping applied to an operator $A$.</td>
</tr>
<tr>
<td>$\sqrt{P}$</td>
<td>The square root of a positive semidefinite operator $P$.</td>
</tr>
<tr>
<td>$s(A)$</td>
<td>The vector of singular values of an operator $A$.</td>
</tr>
<tr>
<td>$s_k(A)$</td>
<td>The $k$-th largest singular value of an operator $A$.</td>
</tr>
<tr>
<td>$A^+$</td>
<td>The Moore–Penrose pseudo-inverse of an operator $A$.</td>
</tr>
<tr>
<td>$|A|<em>p, |A|</em>\infty$</td>
<td>The Schatten $p$-norm or $\infty$-norm of an operator $A$.</td>
</tr>
<tr>
<td>$|A|$</td>
<td>The spectral norm of an operator $A$. Equivalent to the Schatten $\infty$-norm of $A$.</td>
</tr>
<tr>
<td>$|A|_2$</td>
<td>The Frobenius norm of an operator $A$. Equivalent to the Schatten 2-norm of $A$.</td>
</tr>
<tr>
<td>$|A|_1$</td>
<td>The trace norm of an operator $A$. Equivalent to the Schatten 1-norm of $A$.</td>
</tr>
<tr>
<td>$\nabla f(x)$</td>
<td>The gradient vector of a function $f : \mathbb{R}^n \to \mathbb{R}$ at a vector $x \in \mathbb{R}^n$.</td>
</tr>
<tr>
<td>$(Df)(x)$</td>
<td>The derivative of a (differentiable) function $f : \mathbb{R}^n \to \mathbb{R}$ at a vector $x \in \mathbb{R}^n$.</td>
</tr>
<tr>
<td>$\mathcal{B}(\mathcal{X})$</td>
<td>The unit ball in a complex Euclidean space $\mathcal{X}$.</td>
</tr>
<tr>
<td>Borel($\mathcal{A}$)</td>
<td>The collection of all Borel subsets of a subset $\mathcal{A}$ of a real or complex vector space.</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(\int f(x) , d\mu(x))</td>
<td>The integral of a function (f) with respect to a Borel measure (\mu).</td>
</tr>
<tr>
<td>(\text{cone}(A))</td>
<td>The cone generated by a subset (A) of a real or complex vector space.</td>
</tr>
<tr>
<td>(\mathcal{P}(\Sigma))</td>
<td>The set of probability vectors with entries indexed by an alphabet (\Sigma).</td>
</tr>
<tr>
<td>(\text{conv}(A))</td>
<td>The convex hull of a subset (A) of a real or complex vector space.</td>
</tr>
<tr>
<td>(E(X))</td>
<td>The expected value of a random variable (X).</td>
</tr>
<tr>
<td>(\Gamma(\alpha))</td>
<td>The value of the (\Gamma)-function at (\alpha).</td>
</tr>
<tr>
<td>(\gamma_n)</td>
<td>The standard Gaussian measure on (\mathbb{R}^n).</td>
</tr>
<tr>
<td>(X, Y, Z)</td>
<td>Typical names for registers.</td>
</tr>
<tr>
<td>((X_1, \ldots, X_n))</td>
<td>The compound register formed from registers (X_1, \ldots, X_n).</td>
</tr>
<tr>
<td>(\omega_{\mathcal{V}})</td>
<td>The flat state proportional to the projection onto the subspace (\mathcal{V}).</td>
</tr>
<tr>
<td>(\rho[X_1, \ldots, X_n])</td>
<td>The reduction of a state (\rho) to registers (X_1, \ldots, X_n).</td>
</tr>
<tr>
<td>(C(\mathcal{X}, \mathcal{Y}))</td>
<td>The set of all channels mapping (L(\mathcal{X})) to (L(\mathcal{Y})).</td>
</tr>
<tr>
<td>(C(\mathcal{X}))</td>
<td>The set of channels mapping (L(\mathcal{X})) to itself.</td>
</tr>
<tr>
<td>(K(\Phi))</td>
<td>The natural representation of a map (\Phi).</td>
</tr>
<tr>
<td>(J(\Phi))</td>
<td>The Choi representation of a map (\Phi).</td>
</tr>
<tr>
<td>(\Omega) or (\Omega_{\mathcal{X}})</td>
<td>Typical name for the completely depolarizing channel acting on (L(\mathcal{X})).</td>
</tr>
<tr>
<td>(\Delta) or (\Delta_{\mathcal{X}})</td>
<td>Typical name for the completely dephasing channel acting on (L(\mathcal{X})).</td>
</tr>
<tr>
<td>Symbol</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>F(P, Q)</td>
<td>The fidelity between positive semidefinite operators P and Q.</td>
</tr>
<tr>
<td>B(P, Q</td>
<td>μ)</td>
</tr>
<tr>
<td>F(Φ, P)</td>
<td>The mapping fidelity of a map Φ with respect to a positive semidefinite operator P.</td>
</tr>
<tr>
<td>W or Wₙ</td>
<td>Typical name used to refer to the swap operator acting on a bipartite tensor product space X ⊗ X.</td>
</tr>
<tr>
<td>∥Φ∥₁</td>
<td>The induced trace norm of a map Φ.</td>
</tr>
<tr>
<td>∥Φ∥₁</td>
<td>The completely bounded trace norm of a map Φ.</td>
</tr>
<tr>
<td>N(X)</td>
<td>The numerical range of a square operator X.</td>
</tr>
<tr>
<td>Fₘₐₓ(Ψ₀, Ψ₁)</td>
<td>The maximum output fidelity of positive maps Ψ₀ and Ψ₁.</td>
</tr>
<tr>
<td>Zₙ</td>
<td>The ring of integers modulo n.</td>
</tr>
<tr>
<td>Wₐ,ₘₐ</td>
<td>A discrete Weyl operator acting on ℂ^{Zₙ}, for a, b ∈ ℤₙ.</td>
</tr>
<tr>
<td>σₓ, σᵧ, and σz</td>
<td>The Pauli operators.</td>
</tr>
<tr>
<td>A ⊙ B</td>
<td>The entry-wise product of operators A and B.</td>
</tr>
<tr>
<td>Vₚ</td>
<td>Permutation operator corresponding to the permutation π.</td>
</tr>
<tr>
<td>v ≺ u</td>
<td>Indicates that u majorizes v, for real vectors u and v.</td>
</tr>
</tbody>
</table>
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\[ r(u) \] The vector obtained by sorting the entries of a real vector \( u \) from largest to smallest. 236

\[ r_k(u) \] The \( k \)-th largest entry of a real vector \( u \). 236

\( Y \prec X \) Indicates that \( X \) majorizes \( Y \), for Hermitian operators \( X \) and \( Y \). 241

\( S_n \) The symmetric group on \( n \) symbols, equivalent to \( \text{Sym} \{1,\ldots,n\} \). 243

\( H(u) \) The Shannon entropy of a vector \( u \) with nonnegative real number entries. 251

\( H(X) \) The Shannon entropy of the probabilistic state of a classical register \( X \), or the von Neumann entropy of the quantum state of a register \( X \). 252, 266

\( H(X_1,\ldots,X_n) \) Refers to the Shannon entropy or von Neumann entropy of the compound register \( (X_1,\ldots,X_n) \). 252, 266

\( D(u\|v) \) The relative entropy of \( u \) with respect to \( v \), for vectors \( u \) and \( v \) with nonnegative real number entries. 252

\( H(X|Y) \) The conditional Shannon entropy or von Neumann entropy of a register \( X \) with respect to a register \( Y \). 252, 267

\( I(X : Y) \) The mutual information or quantum mutual information between registers \( X \) and \( Y \). 253, 267

\( H(P) \) The von Neumann entropy of a positive semidefinite operator \( P \). 265

\( D(P\|Q) \) The quantum relative entropy of \( P \) with respect to \( Q \), for positive semidefinite operators \( P \) and \( Q \). 266
$T_{n,\varepsilon}(p)$ The set of $\varepsilon$-typical strings of length $n$ with respect to the probability vector $p$.

$\Pi_{n,\varepsilon}$ Projection operator corresponding to the $\varepsilon$-typical subspace of $\mathcal{X}^\otimes n$ with respect to a given state.

$I_{\text{acc}}(\eta)$ The accessible information of an ensemble $\eta$.

$\chi(\eta)$ The Holevo information of an ensemble $\eta$.

$\text{Sep}(\mathcal{X} : \mathcal{Y})$ The set of separable operators acting on the tensor product space $\mathcal{X} \otimes \mathcal{Y}$, respecting the bipartition between $\mathcal{X}$ and $\mathcal{Y}$.

$\text{SepD}(\mathcal{X} : \mathcal{Y})$ The set of separable density operators acting on the tensor product space $\mathcal{X} \otimes \mathcal{Y}$, respecting the bipartition between $\mathcal{X}$ and $\mathcal{Y}$.

$\text{Ent}_r(\mathcal{X} : \mathcal{Y})$ The set of operators acting on the tensor product space $\mathcal{X} \otimes \mathcal{Y}$ having entanglement rank bounded by $r$, with respect to the bipartition between $\mathcal{X}$ and $\mathcal{Y}$.

$\text{SepCP}(\mathcal{X}, \mathcal{Z} : \mathcal{Y}, \mathcal{W})$ The set of separable maps from $\text{L}(\mathcal{X} \otimes \mathcal{Y})$ to $\text{L}(\mathcal{Z} \otimes \mathcal{W})$, respecting the bipartition between $\mathcal{X}$ and $\mathcal{Y}$ and between $\mathcal{Z}$ and $\mathcal{W}$.

$\text{SepC}(\mathcal{X}, \mathcal{Z} : \mathcal{Y}, \mathcal{W})$ The set of separable channels from $\text{L}(\mathcal{X} \otimes \mathcal{Y})$ to $\text{L}(\mathcal{Z} \otimes \mathcal{W})$, respecting the bipartition between $\mathcal{X}$ and $\mathcal{Y}$ and between $\mathcal{Z}$ and $\mathcal{W}$.

$\text{LOCC}(\mathcal{X}, \mathcal{Z} : \mathcal{Y}, \mathcal{W})$ The set of LOCC channels from $\text{L}(\mathcal{X} \otimes \mathcal{Y})$ to $\text{L}(\mathcal{Z} \otimes \mathcal{W})$, respecting the bipartition between $\mathcal{X}$ and $\mathcal{Y}$ and between $\mathcal{Z}$ and $\mathcal{W}$.

$E_D(\mathcal{X} : \mathcal{Y})$ The distillable entanglement of the state of a pair of registers $(\mathcal{X}, \mathcal{Y})$. 
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<tr>
<td>$E_C(X:Y)$</td>
<td>The entanglement cost of the state of a pair of registers $(X, Y)$.</td>
<td>347</td>
</tr>
<tr>
<td>$\text{PPT}(X:Y)$</td>
<td>The set of PPT operators acting on $X \otimes Y$, respecting the bipartition between $X$ and $Y$.</td>
<td>353</td>
</tr>
<tr>
<td>$E_F(X:Y)$</td>
<td>The entanglement of formation of the state of a pair of registers $(X, Y)$.</td>
<td>385</td>
</tr>
<tr>
<td>$W_\pi$</td>
<td>A unitary operator acting on $X \otimes n$, for a complex Euclidean space $X$, that permutes tensor factors according to the permutation $\pi$.</td>
<td>391</td>
</tr>
<tr>
<td>$\mathcal{X}^\otimes n$</td>
<td>The symmetric subspace of $\mathcal{X}^\otimes n$, for $\mathcal{X}$ a complex Euclidean space. Also denoted $\mathcal{X}_1 \otimes \cdots \otimes \mathcal{X}_n$ when $\mathcal{X}_1, \ldots, \mathcal{X}_n$ are identical copies of $\mathcal{X}$.</td>
<td>392</td>
</tr>
<tr>
<td>$\text{Bag}(n, \Sigma)$</td>
<td>The set of functions describing a bag of $n$ items, each labeled by an element of an alphabet $\Sigma$.</td>
<td>393</td>
</tr>
<tr>
<td>$\mathbb{N}$</td>
<td>The set of nonnegative integers ${0, 1, 2, \ldots}$.</td>
<td>393</td>
</tr>
<tr>
<td>$\Sigma^\otimes n_\phi$</td>
<td>The subset of $\Sigma^\otimes n$ consistent with a given function $\phi \in \text{Bag}(n, \Sigma)$.</td>
<td>393</td>
</tr>
<tr>
<td>$\mathcal{X}^\otimes n$</td>
<td>The anti-symmetric subspace of $\mathcal{X}^\otimes n$, for $\mathcal{X}$ a complex Euclidean space.</td>
<td>398</td>
</tr>
<tr>
<td>$L(\mathcal{X})^\otimes n$</td>
<td>The algebra of permutation-invariant operators acting on $\mathcal{X}^\otimes n$, for $\mathcal{X}$ a complex Euclidean space.</td>
<td>400</td>
</tr>
<tr>
<td>$\mu$</td>
<td>Symbol used to denote uniform spherical measure.</td>
<td>408</td>
</tr>
<tr>
<td>$\eta$</td>
<td>Symbol used to denote Haar measure.</td>
<td>411</td>
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<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>$H_{\text{min}}(\Phi)$</td>
<td>The minimum output entropy of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$C(\Phi)$</td>
<td>The classical capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$C_E(\Phi)$</td>
<td>The entanglement-assisted classical capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$\chi(\Phi)$</td>
<td>The Holevo capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$\chi_E(\Phi)$</td>
<td>The entanglement-assisted Holevo capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$I_c(\rho; \Phi)$</td>
<td>The coherent information of a state $\rho$ through a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$I_c(\Phi)$</td>
<td>The maximum coherent information of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$K_{a_1 \cdots a_n, \varepsilon}(p)$</td>
<td>The set of $\varepsilon$-typical strings of length $n$, conditioned on a string $a_1 \cdots a_n$, with respect to the probability vector $p$.</td>
<td></td>
</tr>
<tr>
<td>$\Lambda_{a_1 \cdots a_n, \varepsilon}$</td>
<td>Projection onto the $\varepsilon$-typical subspace of $\mathcal{X}^\otimes n$, for $\mathcal{X}$ a complex Euclidean space, conditioned on a string $a_1 \cdots a_n$.</td>
<td></td>
</tr>
<tr>
<td>$S_{n, \varepsilon}(p)$</td>
<td>The set of $\varepsilon$-strongly typical strings of length $n$ with respect to the probability vector $p$.</td>
<td></td>
</tr>
<tr>
<td>$Q(\Phi)$</td>
<td>The quantum capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$Q_{\text{EG}}(\Phi)$</td>
<td>The entanglement generation capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$Q_E(\Phi)$</td>
<td>The entanglement-assisted quantum capacity of a channel $\Phi$.</td>
<td></td>
</tr>
<tr>
<td>$\Phi_0 \oplus \Phi_1$</td>
<td>The direct sum of maps $\Phi_0$ and $\Phi_1$.</td>
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